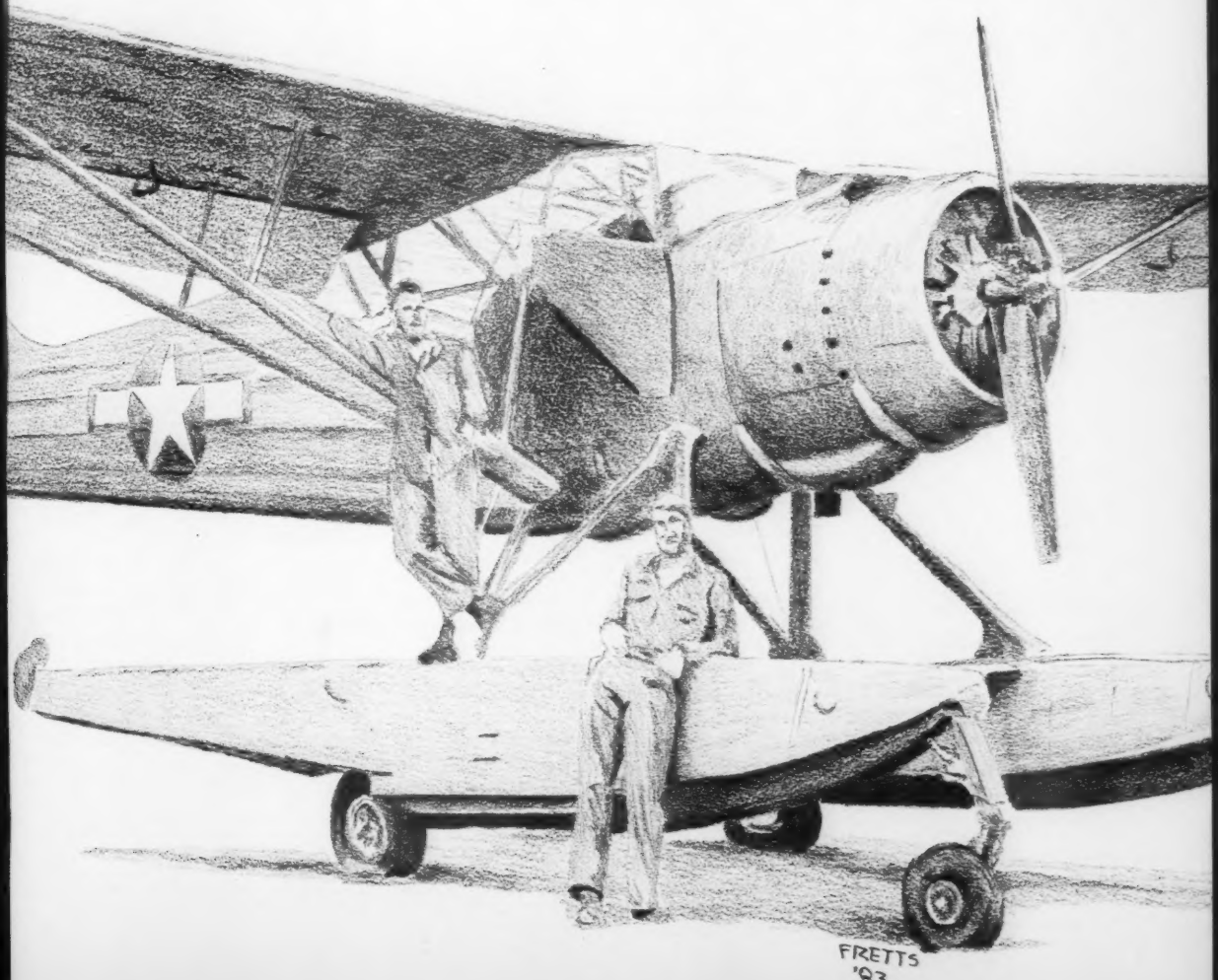
UNITED STATES ARMY

AVIATION DIGEST

JUNE 1983



41 YEARS Army Aviation HISTORY

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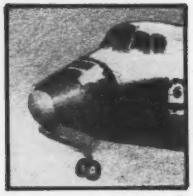

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Honorable John O. Marsh Jr.
Secretary of the Army

Richard K. Tierney
Editor

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The mission of the ***U.S. Army Aviation Digest (USPS 415-350)*** is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

The *Digest* is an official Department of the Army periodical published monthly under the supervision of the Commanding General, U.S. Army Aviation Center. Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center. Photos are U.S. Army unless otherwise specified. Use of the masculine pronoun is intended to include both genders unless otherwise stated. Material may be reprinted provided credit is given to the *Digest* and to the author unless otherwise indicated.

Articles, photos, and items of interest on Army Aviation are invited. Direct communication is authorized to Editor, ***U.S. Army Aviation Digest,*** P.O. Drawer P, Fort Rucker, AL 36362. Manuscripts returned upon request.

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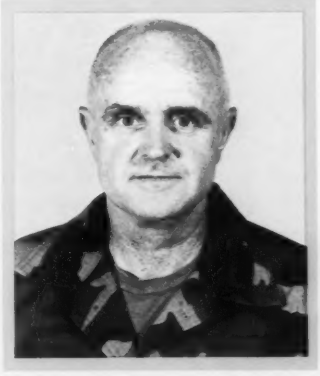
IT IS A GREAT HONOR to assume command of the Aviation Center, especially at this time when Army Aviation has just been designated as a branch. There has been tremendous work already done by many people here and throughout the force to achieve this milestone. Indeed, it is fitting that we all praise and salute the efforts of those who have made our branch status possible.

But, we cannot tarry; in fact, we must intensify and accelerate our efforts as we execute the Training and Doctrine Command's Aviation Implementation Plan. We must quickly gain consensus and decide critical force structure issues so that we can formally establish and document our true needs, both materiel and personnel—this is absolutely essential if we are to obtain potential near-term improvements as the prime combat multiplier on any future battlefield. Concurrently, we must build consensus on, decide and get approved our appropriate branch insignia and other distinctive uniform items. Likewise, of immediate concern to all of us must be the development, standardization, drafting and distribution of doctrinal and training publications—with first emphasis needed in small unit "How to Fight Manuals," checklists, SQT, ARTEP and the like. Most need attention badly. I am aware that much of this work has been done in the field; I believe the principal tasks are for us at the Aviation Center and School to collect that which is available, refine it as needed and get items published so as to capitalize on superb work of the "real user" in the field.

It has been my privilege to serve in several capacities in the Army Aviation Program during my career; I have always found our people to be dedicated toward excellence. This is especially true here at the Aviation Center where we are in the process of centralizing the Aviation proponency. Obviously, I am delighted to be here to lead and participate in that. I pledge to both those at the Aviation Center and all other members of the branch worldwide that together we will continue to build Army Aviation into the Army's most capable and flexible member of the combined arms team. Of course, we cannot falter in our combat development efforts to include fielding of new materiel and aircraft while we now focus elsewhere. As if our plate were not already full with the important work already described above and the challenges for us so apparent, we must seek ways to begin the branch's captains' and lieutenants' training here at the Aviation School sooner. We are working this as a matter of urgency.

In all of these tasks, the Center/School Team and I are dedicated to mission accomplishment, and with excellence in which we can continue to take pride.



Major General Bobby J. Maddox
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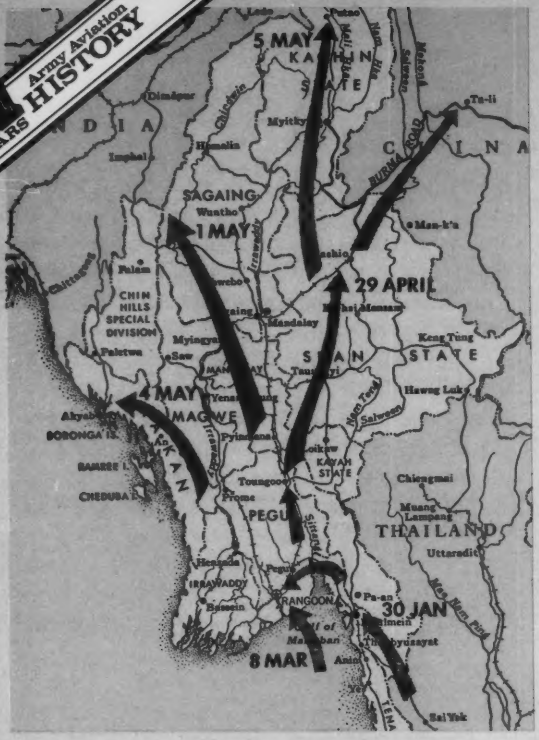

FIGURE 1: Japanese occupation of Burma in 1942.

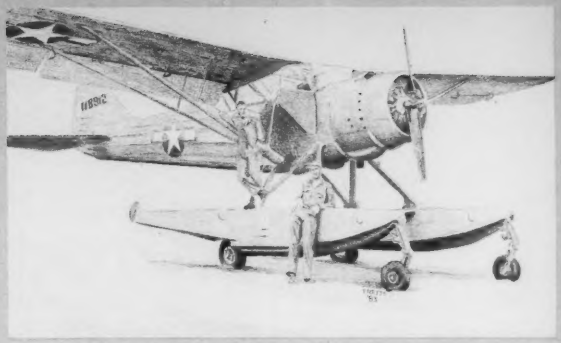

FIGURE 2: OSS located some L-1s for the detachment, one being an amphibian.

Army Aviation in BURMA

Lieutenant General William R. Peers, Ret

Mountains, dense jungle, heavy rainfalls, wild animals and rampant diseases, made northern Burma a less than desirable area in which to conduct military operations during World War II. But, light Army aircraft enabled Det 101 to overcome these obstacles and expand operations.

THE JAPANESE INVADED Burma in January 1942, and by using swift envelopment tactics, they overran almost all of the country by 5 May. Only some small sectors along the border remained under Allied control (figure 1).

When General "Vinegar" Joe Stilwell completed his epic walk out of Burma in June 1942, he said, "I claim we got a hell of a beating. We got run out of Burma and it is humiliating as hell. I think we ought to find out what caused it, go back and retake it."

As the commander of the U.S. China, Burma, India Theater, he immediately began preparing to go back. He planned to equip and train the two Chinese divisions in India, then to employ them from Ledo in northeast India, across the Naga Hills into Burma in a campaign designed to drive the Japanese out of the northern part of the country. A road was to be built behind the combat forces to open a new lifeline to China.

Office of Strategic Services, Det 101, arrived in the CBI Theater in the summer of 1942. It consisted of only 21 officers and enlisted men. But, it was the first unit of its kind organized in the United States to conduct espionage, sabotage, guerrilla warfare, psychological operations, and escape and evasion behind enemy lines. Little did anyone think at the time that this small group would ultimately play a highly significant role in the accomplishment of General Stilwell's plan.

General Stilwell's first directive to the unit was to establish a base camp in northeast India and from there to conduct operations in support of his plan. Emphasis was to be placed on Japanese occupied Myitkyina (pronounced Mitck in ã), its airfield, and the roads and railway leading into it. The next few months were hectic as we recruited and trained agents capable of operating in Bur-

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FIGURE 3: Initial "A" Group operation.

ma; assembled supplies; and designed and built a man-portable radio to operate over the long distances between India and Burma. These were but a few of the problems facing the detachment. By early January 1943, the first group ("A" Group) of eight agents was ready for employment.

The group was flown into the airstrip at Ft. Hertz (Putao) (figure 3), the only airfield retained by the Allies in northern Burma. From there the group moved south and was able to infiltrate through the Japanese lines to proceed farther south toward Myitkyina. However, due to the long distance, the difficulties of the terrain and the heavy load each person had to carry, they were unable to reach the objective area. The mission was aborted and the men returned to base camp. It was not a total failure in that they established contact with the Kachins, a fabulous race of about 350,000 people living in the hill tracts of northern Burma. They were to become the basis of Det 101 guerrilla operations.

Northern Burma Terrain.

Northern Burma is at the base of the Himalaya Mountains; some peaks in the country exceed 15,000 feet. Portions of the so called hills reach even to 10,000 feet. Teak and other hardwood trees form a canopy 100 feet to 150 feet above the ground. Where the sunlight can filter through, the jungle is dense, almost impenetrable. During the 4-month period of the summer monsoon, the rainfall averages about 250 inches. These features, combined with the tigers, the cobras, the leeches and rampant diseases make northern Burma a most difficult area in which to conduct military operations.

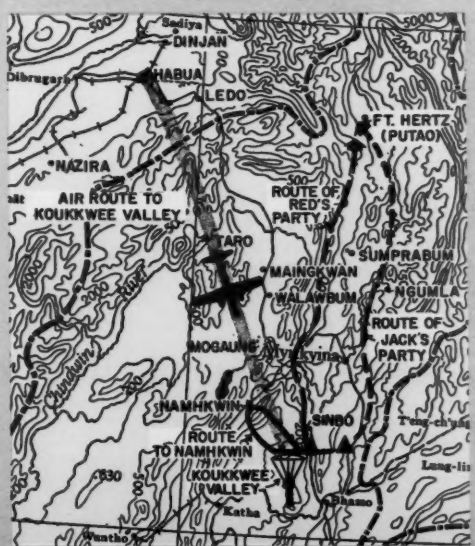
From the first operation, it became quite apparent that the use of land routes to infiltrate agents was not the answer. The obvious solution was to use aircraft to drop both personnel and supplies. But there were problems; Det 101 did not have airplanes or parachutes, and none of its members had ever parachuted from an airplane.

By coincidence the Air Transport Command was losing an inordinate number of its aircraft and crews in flights across the hump. Some losses were due to Japanese Zeros (fighter planes), while others fell victim to the weather, mountains or mechanical failures. Accordingly, when Det 101 approached the Air Transport Command to obtain airdrop support, the commanding general was ready and willing to work out an agreement. In exchange for Det 101 developing operations to rescue Air Transport Command people from behind Japanese lines, they would provide drop aircraft, parachutes and a qualified parachutist. This proved to be an excellent give and take. By the end of the Burma campaign in June 1945, Det 101 had rescued 232 Air Transport Command and 342 other Allied people. In return, excellent air support had been provided.

First Airdrop Operation.

The group of eight agents from the previous ground infiltration attempt, augmented by four Kachins, was chosen and given rudimentary ground training to make a parachute jump (figure 4) from an armed C-87 (converted B-24 aircraft)

FIGURE 4: "A" Group parachute operation.



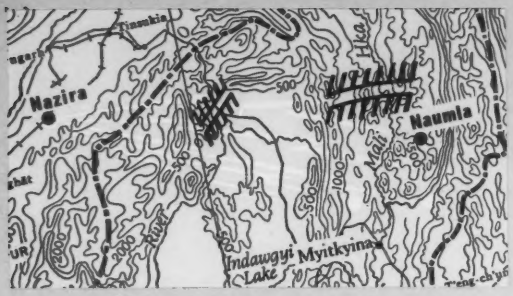


FIGURE 5: Det 101 established six field base camps.

into an area 100 or so miles south of Myitkyina. They used seat type parachutes to be opened by rope static lines.

Despite the crudeness of the airdrop, all of the agents and supplies were successfully parachuted into the drop zone. From there they moved west across the Hopin Hill Tract into the railway corridor where, over a period of time, they planted 27 delayed demolition charges along the railway and destroyed a large bridge. They also provided valuable tactical information about Japanese positions which was passed to the 10th Air Force. With the arrival of the monsoon, the group (A Group) exfiltrated through Japanese lines to Ft. Hertz to complete the operation.

During the remainder of 1943, Det 101 was able to establish six field base camps across northern Burma (figure 5), each in radio contact with the base at Nazira. Their mission was to gather information and recruit and train guerrilla forces for local operations.

Chinese Breakthrough.

Events were moving rapidly. General Stilwell's Chinese forces had made a successful penetration into the Hukawng Valley in northwest Burma. Four additional divisions were being flown in from China to augment his force and Merrill's Marauders were also assigned. Det 101 was increasing its personnel strength, was procuring proper parachute equipment, and was gaining considerable experience in field operations.

Det 101's interest in light aircraft was awakened in the spring of 1943. Without such aircraft, the wounded, the prisoners, newly recruited espionage agents and others had to be evacuated by land routes through Japanese-held territory. A major from Det 101, with the aid of a couple of cartons of cigarettes and some fast talking, was able to obtain a World War II-type Gypsy Moth biplane (built in 1925) from the Royal Air Force in India (figure 6). OSS sent a young pilot from the States and a mechanic was recruited in Calcutta. Det 101 was in the business. Our field bases were directed to clear trees and prepare and camouflage runways.

FIGURE 6: The author in the front seat of a Gypsy Moth.

Shortly thereafter, one of the field units captured a Japanese fighter pilot who had ejected when his plane had been shot-up. He was moved to one of the field bases with an airstrip. Colonel Carl F. Eifler, commander of Det 101, a qualified pilot, decided that he would use the Gypsy Moth to fly in and pick up the prisoner. It was about 250 miles from the Det 101 base to the field base across the Naga Hills and uncharted jungle in the Hukawng Valley.

Gasoline for refueling was airdropped into the field base. The roundtrip flight was successfully made with the prisoner securely bound and noosed. Through considerable interrogation, information was obtained from the prisoner about where the Japanese based their fighters that were operating against the hump flights. Up to this time, all information, including air photos, indicated a Japanese airbase near Mandalay was inactive. The 10th Air Force heavily bombed it and air operations against the hump decreased dramatically.

Later, Colonel Eifler picked up another prisoner from another field base, but he was only a private and could provide little information. Still later, he flew Major General William "Wild Bill" Donovan, director of OSS, into one of the field bases. In light of these successes, a Stinson 105 was obtained from a British Aero club and an

urgent request for light aircraft was sent to OSS in Washington.

By early 1944, General Stilwell's Chinese forces and Merrill's Marauders were making good headway in their attack down the Hukawng Valley. He was optimistic that he could capture Myitkyina and its airbase before the coming monsoon. He directed Det 101 to increase the size of its guerrilla forces to 3,000 and to extend intelligence agent operations well to the south. If successful, he said he would authorize expansion of the guerrilla forces to 10,000. To make all of this possible, he made available six drop aircraft (DC-3s) on a daily basis, provided the necessary arms and ammunition, and established a high priority for shipment of critical equipment from the States.

Det 101 In Action.

Det 101 accomplished its assigned mission. Numerous ambushes and raids resulted in bridges destroyed, trains derailed, supplies captured and more than 1,000 Japanese killed. Vital tactical information was collected and provided to the ground forces and the 10th Air Force. When the Chinese-American Task Force, spearheaded by Merrill's Marauders, launched its flanking move on Myitkyina, Det 101 Kachin guerrillas served as guides and provided flank protection. A young Kachin guerrilla led the Marauders through the jungle and onto the Myitkyina airfield to the complete surprise of the Japanese. General Merrill sent a message to the detachment: "Thanks for your assistance; we could not have succeeded without the help of 101."

While the Hukawng Valley and Myitkyina campaigns were underway, Det 101's light aircraft capabilities were greatly expanded. Several L-4s and L-5s arrived from the States and others were made available by CBI Strategic Air Command. OSS Washington was also able to locate and ship some L-1s, including an amphibian (see figure 2, page 2). The L-1 proved to be an ideal plane for operations of this kind. It was a large aircraft with a radial engine to provide ample power, had large wings with flaps and slots and could carry more than 1,000 pounds. It could take off from very short runways, 50 to 100 feet, at about 30 mph. The only drawback was its weight, about 5,000 pounds; it was difficult for ground handling on muddy, hastily improvised strips during the monsoon.

Light aircraft support of General Stilwell's forces was provided by the U.S. Army 71st Liaison Squadron, commanded by Captain Ned O. Epps. He was an outstanding commander with an exceptionally fine and effective unit. As the Det 101 airfleet increased in size, a pilot shortage developed. Captain Epps detached some of his pilots to Det 101 for periods up to 6 months; some pilots in fact were transferred. This fine relationship continued until all conventional U.S. combat forces were withdrawn from Burma.

With the improvement in light aircraft capability, Det 101 was able to expand the scope of its air operations. Critical medical supplies and fragile items of equipment such as radios were flown in. It also improved command and control, permitting the commander to fly into field units to review the situation, develop plans and issue instructions.

The battle for Myitkyina city went on for more than 2 months. During this time, Det 101 was busy reorganizing its guerrilla forces 100 to 125 miles to the south and expanding them to 10,000 as approved by General Stilwell. B-25 aircraft were used to drop intelligence agents and extend their activities almost to Rangoon. The British 14th Army on the Imphal front to the west was under heavy pressure from a force of five Japanese divisions. Det 101 assisted by conducting several highly effective raids against the Japanese, destroying two large ammunition and supply depots and 27 trucks and artillery pieces.

Det 101 likewise supported the British long-range Chindit Division, commanded by Major General Orde Wingate, by providing an encircling intelligence agent network. Air support for the Chindits was provided by the 1st American Airborne Commandos with a fleet of P-51s, B-25s, DC-3s, gliders and light aircraft, including L-1s. They used the gliders to land engineer equipment and build an airfield at the same spot that Det 101's first group had been dropped. Later the main force of the division was flown in. The Commando L-1 operations were a boon to Det 101 in obtaining spare parts, cannibalizing downed aircraft and taking over their remaining aircraft when the unit was disbanded (figure 7, page 6).

As operations moved to the south, light aircraft operations became somewhat easier. A base with

FIGURE 7 (ABOVE): L-1s used in a command operation—a boon to Det 101.

FIGURE 8: Photo taken during the period the author was evacuating British wounded and troops from Lake Indawgyi.

an airfield and repair facilities was developed at Myitkyina. The terrain in the Irrawaddy River Valley leveled off, making it simpler for field units to carve out an airstrip from the jungle. Some rice fields were also in evidence. During the dry season, a landing site could be made by simply leveling off some of the earth in dividers (bunds) between the rice paddies. But all was not so simple. The airfield of one of the largest units was dug out of the side and near the top of a 7,000-foot mountain. To land an L-1, the pilot had to fly upward under full power, land, cut off power and stop within 150 feet. For takeoff, the plane was literally flown off the end of the runway and nosed down to gain flying speed. Sometimes it was rather windy, so each trip was an experience.

By March 1945, the Chinese and American forces had been successful in their drive south and had captured Lashio and opened the way for a new lifeline to China (the Stilwell Road). The British on the Imphal front had inflicted a decisive defeat on the Japanese and were approaching Mandalay and the Irrawaddy Plain. Det 101 had reached its greatest strength. More than 10,000 Kachin guerrillas had been trained and equipped by about 300 Det 101 officers and men behind the lines and in excess of 500 intelligence agents were operating in the field. There were 12 DC-3s used to airdrop personnel and a daily average of 36 tons of supplies and equipment. The light airfleet consisted of 11 L-4s and L-5s, 5 L-1s and 1 C-64. The pilots, with the exception of one civilian, were all Army sergeants.

L-1 Uses Expanded.

During this time, Det 101 also used its L-1s to assist other Allied military units. A battalion-sized column of Wingate's Chindits encountered an area of high grass swamp near Lake Indawgyi and were progressing only a half to a mile a day. When they reached the lake they were exhausted and many were sick and wounded. For 2 days the amphibious L-1 evacuated the disabled (figure 8 above). How many is not known, but on the last flight, several were tied to the pontoons. Also, when Mars Task Force, a two-regiment size U.S. force including the Marauders, was caught in a bowl-like defensive position north of Lashio, it was Det 101's L-1s that continued to evacuate the wounded despite heavy mortar fire on the runway.

On another occasion, Det 101 had need to put an agent into the field southwest of Lashio. Dropping an agent behind Japanese lines with his radio and supplies was always a hazardous operation. The 10th Air Force had recently acquired an R-4 helicopter for rescue purposes. Since Det 101 was providing 60 to 85 percent of the targets, the Air Force willingly agreed to the use of the helicopter. It had only limited capabilities. Its maximum ceiling was 7,000 feet, and with a passenger it was unable to lift off at more than 3,000 feet above sea level. The area in which the agent was to be inserted was over 4,000 feet, which meant that once landed the agent and his equipment were there to stay. The flight of about 300 miles roundtrip was successful.

The agent did an excellent job in that area and later moved by land trails another 125 miles to the south. His performance was exceptional. He not only provided vital information but also was responsible for the capture of the local Japanese administrator and two economists. These were flown out by light aircraft and provided critically important data. This operation may well have been the first and perhaps the only operation in

World War II in which a helicopter was used to insert an espionage agent behind enemy lines.

In March 1945, after Lashio had been captured, Lieutenant General Daniel I. Sultan, who replaced General Stilwell to become the commander of the India-Burma Theater, considered that there was no longer a need for Det 101 and ordered it to be disbanded. However, the situation in China was deteriorating rapidly and Kunming was being threatened. The six Chinese divisions and Mars Task Force were flown to China. That left no combat troops, except the remnants of the Det 101 guerrilla force, to protect Lashio and the newly opened Stilwell Road. Accordingly, General Sultan issued a new order to Det 101. In effect it said to recreate a guerrilla force as rapidly as possible to clear the Japanese out of an area between Lashio and Mandalay, to extend south about 100 miles, and to seize the Japanese escape route to Thailand. This was an area of about 10,000 square miles and contained in excess of 5,000 Japanese troops, including the first-rate units guarding the complex of three airfields at Heho. It was certainly not considered to be a push-over.

One battalion of guerrillas remained intact. It moved south through the hills to avoid contact and to initiate operations along the escape route. Meanwhile, three additional battalions were equipped and trained. They moved south over separate routes. All of them met stiff resistance. The roughest going was encountered by the battalion opposing the Japanese units guarding the airfields. Through some skillfully conducted ambushes, the battalions' members were able to inflict heavy losses on the Japanese, but they also suffered considerably.

Another battalion seized an airfield in the rear of the Japanese forces. It was demined and prepared for combat operations. Five P-38s of the 10th Air Force were flown in to be based there and to work in conjunction with Det 101's light aircraft. The light aircraft served as forward air controllers, using smoke grenades to designate targets to be hit by the P-38s. By mid-June, all battalions had reached their objectives and the area was turned over to British control. More than 1,250 Japanese had been killed; Det 101 guerrillas lost more than 300, by far their heaviest losses of the war. For this operation, the detachment was awarded the Presidential Unit Citation.

Det 101 was eminently successful in its operation. However, much of the credit for its success was due to the use of aircraft. Certainly, the air-drop capability was an essential ingredient and the flexibility of light aviation added a new dimension. This operation of 40 years ago is now history. The emergence of the modern helicopter would undoubtedly change the scope and complexion of such operations, but still there is much to be learned. Every member of the detachment continues to look with great pride upon his contribution as well as the unit's overall accomplishments.

Finally, a word must be said about the pilots of the light aircraft. They flew over some of the world's most difficult jungle and mountain terrain, through the clouds and torrential rains of the monsoon and operated out of short, rough and often precarious landing strips. Yet, they were always ready to fly and the aircraft accident rate was surprisingly low. They were a courageous, talented and highly effective group of people. The Army can well be proud of them.

ABOUT THE AUTHOR

General Peers reported in early 1942, then a captain, to the Office of Strategic Services and was assigned to Detachment 101. He moved overseas with the unit in May 1942 as the operations and training officer. In this capacity he was responsible for planning and coordinating the development of guerrilla operations, espionage, sabotage and other clandestine operations in support of the combat forces of the Northern Combat Area Command in northern Burma under General Joseph Stilwell. In December 1943 he replaced the detachment commander, who became incapacitated due to injury. He was promoted to colonel in February 1945 and remained in command of OSS Detachment 101 through the North Burma and Central Burma campaigns until July 1945 when combat operations in Burma were terminated and the unit inactivated.

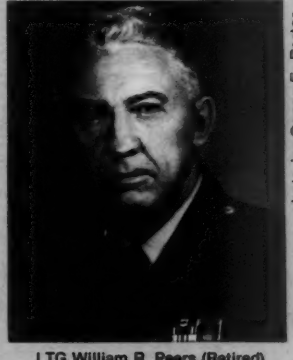
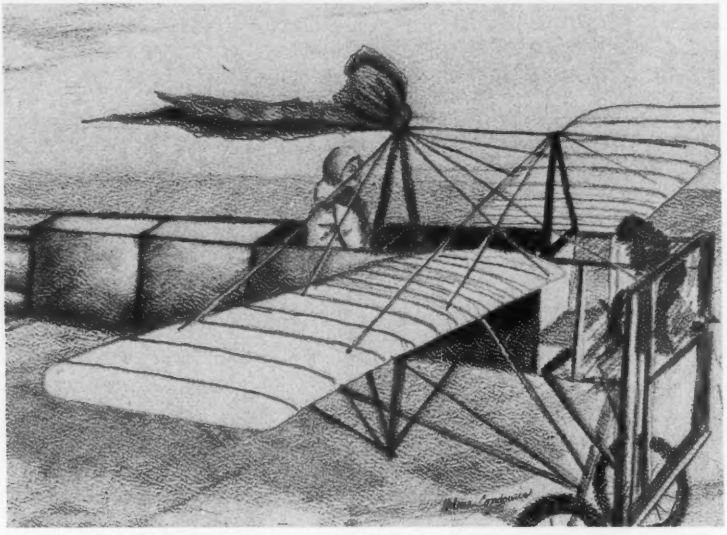


photo by Oscar E. Porter

LTG William R. Peers (Retired)

Army Aviation avionics has come a long way from a piece of cloth attached to the landing skid, to the microwave tactical landing system avionics used in the space shuttle Columbia.



Army Aviation AVIONICS

Major Cornelius J. Westerhoff
Command, Control and Communications Division
U.S. Army Avionics Research and Development Activity
Fort Monmouth, NJ

IN THE VERY recent past, the world marveled at the sight of the space shuttle Columbia hurdling toward the California desert. An incredible promise of science and technology became reality as the shuttle descended from deep space until its perfect deceleration and touchdown at Edwards Air Force Base. That memorable landing is just one page in the colorful history of Army Aviation avionics development.

Army Aviation avionics in the space shuttle? That hardly seems possible because of the four services, the Army's aircraft certainly are among the most spartan when it comes to avionics gear. Yet the space shuttle used a microwave landing system first developed by the Army in the early 1970s.

The Army's Avionics Research and Development Activity at Ft. Monmouth, NJ, a division of the U.S. Army Aviation Research and Development Command, conducted research into the development of a landing system which would allow a rotary wing pilot to begin a deceleration while still under IMC. The purpose for that system is best visualized if you consider what hap-

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illustrations by Helene Condouris

pens when an aircraft flies a normal GCA or ILS approach. The aircraft maintains airspeed until the decision point or breakout, at which time the aviator has to decelerate before coming to a successful landing.

If the approach is being made to a confined area, such as is expected under current tactical instrument doctrine, then the aircraft usually has insufficient time in which to decelerate to make a successful approach. Slowing down while still under IMC conditions becomes very dangerous unless the pilot has some cues to guide him, particularly if the airspeed is slowed much below 60 knots. Therefore, the Army developed a microwave landing system which would tell the pilot exactly what control inputs to make in order to slow down sufficiently.

The system, through the use of a rather fancy attitude indicator, actually tells the pilot how much to lower or raise the collective, where to place the collective and how much pedal to apply. It is so responsive that a completely blind landing is possible without ever looking outside the cockpit, until perhaps the final 2 or 3 feet. In other words, the pilot never has to visually take over the landing as is necessary in any other instrumented approach. A zero-zero landing is indeed possible using this system. Not just a zero-zero landing, but one in a confined area as well!

When the National Aeronautics and Space Administration began to look for an instrument landing system which could tell the astronaut when to begin decelerating the space shuttle, an obviously very critical and spectacular part of the flight just before touchdown, the Army's microwave tactical landing system was clearly the thing it was looking for. And that, in short, is how Army-developed avionics wound up in orbit.

The history of avionics has a great deal of olive drab mixed with it, dating back to the dawn of aviation. The purist will say that Army Aviation started in 1942 when a few L-4 "Grasshoppers" were made organic to Field Artillery units. That might be fine for the historical

buffs and other "pure" individuals, but since there are probably very few "pure" Army aviators, let's turn the clock back to 1909 when the Army bought its first aircraft. Called U.S. Army Aeroplane No. 1, this "Wright Flyer," along with just a few others, was the only clean aircraft ever bought by any service. Clean means that the aircraft sported absolutely no instrumentation of any kind! Not even the most rudimentary engine performance gauge could be found on the forerunners of military aircraft.

The pioneers of aviation did not consider instruments a necessity since speed could be "felt" by the wind in your hair, altitude could easily be seen and engine performance was pretty obvious since the pilot sat just in front of the unprotected and uncovered machine. Unfortunately for those of us about to undergo the rigors of renewing an instrument ticket, it did not take long before convention made way for invention and instruments began to appear on those rickety aircraft.

Arguments may vary, but the very first instrument to be found on an Army aircraft was a piece of cloth tied or nailed to the landing skid directly in front of the pilot's station. This told the pilot if the aircraft was flying reasonably straight or slipping to one side. It was probably the first and last example of a very unique item in military inventory—an instrument which cost absolutely nothing, required no maintenance, was in plentiful supply and only failed when it wasn't properly attached to the aircraft. Its shortcoming was that it didn't do much for the pilot but then that has been said about a lot of very expensive gadgets developed over the years.

About the same time that the first homemade slip indicator found its way to Army aircraft, Captain Charles De F. Chandler, Signal Corps, invented the seat belt. Although not really an item of avionics equipment, its invention was certainly an important step in aviation safety and its development deserves some mention. On landing, it seems that Captain Chandler frequently suffered the embarrassment of failing to stop at the same time as his aircraft did.

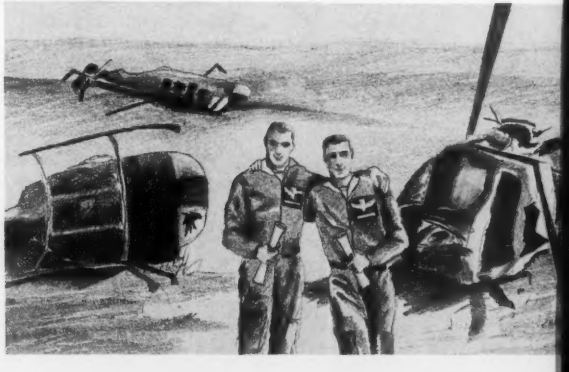
The first aircraft were equipped with landing skids which slowed the airframe down in a hurry, especially on some of the plowed fields used as airfields. After picking himself up from the ground on several occasions, Captain Chandler asked a Cavalry harnessmaker to provide him with a wide leather belt which he installed in his aircraft. Strangely enough it would be many years before that simple and convenient device would make its way into general aviation. Some of the first aviators to attempt a loop discovered, to their great regret, that they did not always remain "glued" to the seat.

The Signal Corps was very much the driving force behind the development of avionics, as well as aviation in general. Aircraft were first used in the adjustment of artillery fire at Ft. Riley, KS. Lieutenant Henry (Hap) Arnold, later to become the first Air Force Chief of Staff, mounted the first known wireless transmitter on an aircraft. He reported to his boss that transmissions were clearly heard on the ground some 6 miles away while the aircraft flew at an altitude of 1,000 feet. How much we take for granted today!

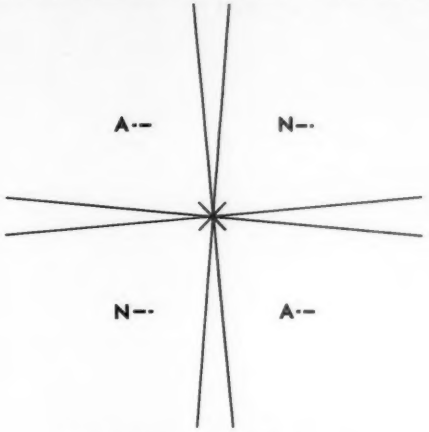
LT Arnold also devised a smoke signalling device on a second aircraft, but he discovered that it was tough to make dots and dashes using smoke. It was during these experiments that LT Arnold became one of the first aviators to discover the hazards of stalling an aircraft. While dropping cards with artillery adjustment corrections written on them, his aircraft went into a stall and dropped perilously close to the earth. LT Arnold was fortunate to recover the aircraft just before impact. That experience made him write to his boss back in Washington, "At the present time my nervous system is in such a condition that I will not get in any machine." He also asked for a couple of weeks leave. History does not record if it was approved.

The lack of instrumentation and avionics resulted in the loss of a great many aircraft in those early days.

In the early days a student and his stick buddy could destroy three aircraft before finishing the training course.



FOUR COURSE LOW FREQUENCY RADIO BEAM



Pilot listens for a monotone, then flies down the beam.

Seat-of-the-pants flying was considered the only way in which pilots should be trained. That kind of philosophy made for an expensive training program. In 1917 a government report calculated that it took one and one-half aircraft to train a pilot. That was not how many aircraft had to be available to conduct a flight training program, but how many aircraft would be totally consumed in the conduct of flight training. In other words, using a current day example, a flight student and his stick buddy would totally destroy three aircraft before they finished the course! The report also noted, in not untypical governmental understatement, that, "The breakages are most often made by the men who fail to qualify."

In the early 1920s, the first radio beacon navigation system was developed, primarily at the request of the War Department. The current nondirectional beacon has remained virtually unchanged over its initial development during the 1920s. The first NDBs were not easy to use, however, and the pilot required extensive training to get much out of the system.

The NDB transmitter consisted of two antennas, each transmitting a different frequency. One antenna transmitted the Morse code of the letter "A" (a dot-dash) while the other transmitted the Morse code for the letter "N" (a dash-dot). The system created four separate courses to the transmitter where the receiver would get both signals at equal strength. If the pilot heard one letter a little louder than the other, he knew he was not on one of the four courses to the transmitter. He then would have to intercept the course which transmitted a steady monotone. Unfortunately there was no indicator to tell the aviator in which direction he had to fly to intercept the course or even in which of the four quadrants he was flying.

Range to the transmitter had to be determined, or guessed if you prefer, by the strength of the signal. The constant static over the radio required very concentrated listening, particularly since the development of headgear and earphones had not yet reached very impressive standards. It was also one of those "Catch 22s" in that just when the pilot required his most concentrated attention for listening it was also the time when flying conditions were at their worst. After all, the only time that a pilot flew to a radio beacon was when the weather was too poor to fly visually.

The need for a visual system to tell the pilot if he was on or off course was obviously needed. An instrument was developed out of that need which remained around for several decades. It was a simple gauge containing two reeds which vibrated at different frequencies. If the signal from one of the two transmitting antennas was stronger than the other, its corresponding reed would appear longer. If the signals were of equal intensity then the reeds appeared equal in length.

VISUAL COURSE INDICATOR COCKPIT DISPLAY

PLANE TO LEFT OF BEAM | PLANE EXACTLY ON BEAM | PLANE TO RIGHT OF BEAM

Again there was no indication if the aircraft was headed to or away from the station or even where the inbound courses were located. Nevertheless, the visual indicator was a great improvement to the previous system.

Two of the real Army pioneers in the development of instrumentation are Major Bill Ocker and a flight surgeon, David A. Myers. They conducted the first experiments proving that the senses alone are not enough

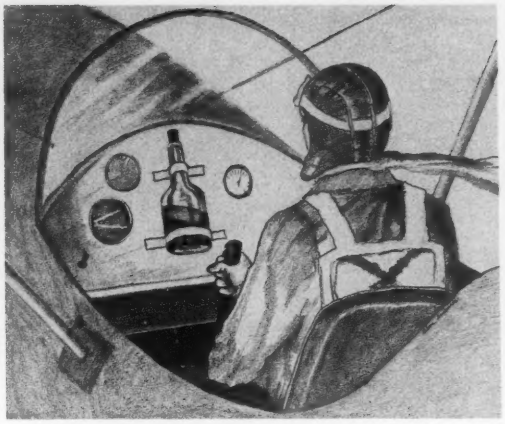
when flying "blind." Major Ocker and Mr. Myers devised a closeable box, large enough for someone to sit in, which could be spun in either direction. In this box they placed selected volunteers who were convinced that they would be able to tell exactly in which direction the box was moving as well as how fast or slow it was spinning. Of course, the pilots who participated in this demonstration were amazed to discover that they really could not "feel" their way through the experiment.

The next step was to place some instrumentation in the box which would provide the volunteer with directional information. The directional compass they placed in the box worked on the venturi principal and the test subject was required to blow in a tube while being spun in the box. The combination of having to huff and puff in a hose while being spun around in a tight box did not make for a very popular or enjoyable experience, but Major Ocker and Mr. Myers had provided aviation with a valuable discovery. Scientific proof that instrumentation was essential for weather flying was finally available.

Major Ocker ran into considerable difficulty when he attempted to persuade military authorities about his discoveries. Becoming a salesman for instrumented flight did not sit well with some of his seniors. Twice he was hospitalized by his commanders for sanity tests. The attitude that a real pilot uses his senses alone was not going to die easy.

In spite of Bill Ocker's difficulties in selling instrumented flight, there were many aviators during his day who began to see the need for better equipment. Innovation became a necessity and ingenuity was never lacking among the pioneers of flight. Some pilots used a carpenter's level attached somewhere in front of them hoping that the bubble would tell them if they were flying anything other than straight and level. Perhaps the most practical early attitude indicator was described by one pilot to be a half-empty whiskey bottle taped to the instrument panel. The pilot reasoned that the level of the liquid would more or less tell him the attitude of the aircraft. If he crashed he could then use the bottle's contents to provide him some measure of comfort until help could arrive.

The search for better flight instruments and navigational equipment received a major boost as the result of one of the greatest tragedies in early Army Aviation. In the 1930s airmail had already become an expected service and was conducted by private contractors hired by the government. It wasn't long before the government suspected fraud by some of those contractors. Incidents occurred where mailbags were loaded with rocks to increase their weight. As a result, the government abruptly terminated its contracts and gave the Army 10 days to prepare to take over the mail service.



This whiskey bottle attitude indicator was also the survival kit in case of a crash.

Although it was the Army that had started the airmail service in 1918, it was ill-prepared to assume total responsibility some two decades later. During the first 6 weeks of carrying the mail, the Army had 12 pilots killed and suffered another 15 critically injured. It became obvious that "seat-of-the-pants" flying no longer had a place in professional aviation. The problem was hardly new as 31 of the first 40 commercial airmail pilots had lost their lives in crashes. As a result of the disastrous experience the Army had with providing airmail service, Congress responded with a sizeable increase in funds to conduct training for military pilots.

Flight under the hood, still not a popular pastime among Army aviators, has actually been around for almost half a century. The renowned Jimmie Doolittle startled the world in 1929 by conducting a fully hooded takeoff, flight and landing, all while in a totally enclosed and curtained cockpit. What was truly remarkable about that achievement is that it was con-

ducted using only the most rudimentary radio guidance systems. Jimmie Doolittle was determined not only to prove instrument flight was the way of the future but also that a full landing was possible, all while under a hood!

The only radio navigation system which existed in those days was nondirectional beacons of the type described earlier. The term nondirectional was unfortunately appropriate. Doolittle made his demonstrated flight using two beacons. One was used as a very rough localizer while the other was used as a marker beacon to indicate a specified distance from the airfield. The marker beacon idea was a good one but it worked almost directly opposite today's marker beacons. The only place where the signal did not transmit was directly above the antennas, creating a "cone of silence." The pilot's only indication of station passage was reaching the cone of silence directly above the beacon. If the pilot was just a little bit off course the signal never ceased transmitting and he never knew if he had station passage or even where he was in relation to the beacon.

Doolittle also did not have any sort of glide slope indicator, so his procedure was to establish a steady rate of descent after he reached the marker beacon with the hope that he reached the ground at the same time that he reached the planned landing area. Obviously his timing had to be pretty accurate to avoid disaster. The one concession that was made to the otherwise normal aircraft was a beefed up landing gear to absorb the expected impact of the completely blind landing.

It was Doolittle's well-calculated flight which resulted in the greatest single advance of avionics. When Doolittle was preparing to conduct his hooded takeoff and landing, he knew he had to have major improvements in at least three of his existing instruments. His first priority was to obtain an accurate altimeter, one that would be accurate to a few feet instead of the hundred or so on existing equipment. For that he turned to a German-born engineer, Paul Kollsman, whose improvements to the altimeter provided the necessary accuracy which has survived with little change to this day. It also resulted in the Kollsman window found on almost all Army altimeters.

It was also clear that an improved course indicator and turn indicator had to be developed. The available instruments were extremely unstable and usually failed to perform during conditions of turbulence which were the times when they were needed most. The improvements in those instruments were provided by Elmer Sperry and his son, Lawrence, an already famous name in aviation.

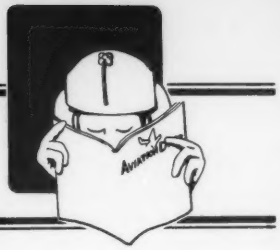
The Sperrys had developed the first gyro stabilized turn-and-bank indicator in 1918, well before it was to be truly appreciated. Elmer Sperry's work for Doolittle's flight resulted in the first artificial horizon which has also survived in pretty much the same form to see service in most Army aircraft today.

Despite the proven concepts of instrumented flight and the demonstrated proof that the senses were not enough for weather flying, it would be many years before instrumented flight would reach full maturity. Many incredible tales of disaster and narrow escapes continued to be told. One of the most famous and curious should be appreciated by every Army aviator working on an instrument ticket, or renewing an old one. On 17 July 1938, Douglas Corrigan took off from New York in an attempt to establish a new nonstop record to Los Angeles. After some 26 hours into the flight he noticed water beneath the aircraft and came to the shocking realization that he had been following the wrong end of the compass needle! Having no other choice he continued on his present heading and finally landed around Dublin, Ireland. "Wrong Way Corrigan," as he became known, then turned his attention to growing oranges in California.

Recent advances in avionics parallel the electronics explosion of the past decade. Army aircraft are being fitted with Doppler navigation systems, heads-up displays, radar altimeters and much more. The Avionics Research and Development Activity at Ft. Monmouth is making dramatic advances in the development of a single pilot cockpit. Obvious to any aviator transitioning into some of the newer Army aircraft is that it takes a lot of work to learn how to use all of the systems in the aircraft. It is being said that it now takes more effort to learn how to use the aircraft systems than it does to learn how to fly the aircraft! That's quite a switch from the Wright flyer of not that many years ago.

The search is for a system that will allow a single pilot to conduct a mission without losing the benefit of any of the aircraft systems. The ideal is to have a truly all-weather capability that allows the commander positive control and the aviator the edge to fight outnumbered and win. Clearly the exciting part of the history of avionics is that most of it is still ahead of us. New developments surface ever more frequently. To use an appropriate cliche, "stay tuned!"

VIEWS FROM READERS



Editor:

Request one copy of the complete "Forty Years of Army Aviation" series be sent to Commander, 330th EW Avn Co (FWD).

MAJ Jeffrey W. Wright, MI
APO New York

Editor:

At the risk of being called a "heretic" and nonpublication of this letter, I feel obligated to awaken Army planners and other seers to one pertinent fact they have either forgotten or ignored: A helicopter is *not* a fighter and can never *be* a fighter. Due to its inherent complexity and the fragility of its rotor system—no matter what fancy acronym is applied—it can be only one thing: a helicopter. True, it might be a fast and maneuverable helicopter but it can never out-maneuver or out-speed a similar fixed wing.

Before Cobra drivers and other hot-rocks rise up in righteous indignation, let me explain. With the right type of light, small, rugged highly maneuverable fixed wing, a pilot who is familiar with helicopter air combat tactics can always defeat the rotary winged aircraft. How? Simple! Any propeller-driven fixed wing capable of rapid acceleration, with good visibility, has much more kinetic energy in air combat maneuvering, particularly in the vertical, that the helicopter is hopelessly out-matched. All one would have to do is remain above the helicopter and be alert for any quick stop type of maneuver, execute any type of low or high speed yo-yo that the helicopter cannot match and the contest is over—never mind missiles, with guns alone! If the helicopter masks or hides, simply orbit above its last position high enough to avoid guns or missiles, and wait!

"Forced Landing!"

Most of us are aware of the high kill ratios between Cobras and various fast-movers. The reason? The fast mover *could not see* the helo! But with a smaller propeller driven airplane that can slow down and operate in the helicopter's regime, and again if the airplane's pilot has some knowledge of helicopter defensive tactics, there is only one outcome.

What kind of fixed wing would be ideal? Several come to mind, but the primary choice is the Piper Enforcer which has recently undergone Air Force testing. Of course the Air Force doesn't want it; they were forced into testing the Enforcer by Congress. Besides, its turbo-prop (Lycoming T55, just like the Chinook), an older design (a completely restructured and rebuilt F-51 Mustang airframe), and it doesn't go mach 12 or have all sorts of fancy systems or titanium bathtubs or whatnot. The A-10 as an alternative? To paraphrase an Israeli Air Force general after reviewing the A-10, it seems like we never learn from history! The A-10 in concept and design is nothing but a twin engined Junkers Ju-87 Stuka. Pleasant to fly, but hardly survivable in anything more than a low intensity conflict.

Another fact others seem unaware of; just how are we going to afford the AH-64 at $16 million *each?* Are we to forego replacement parts or flying hours for our massive helicopter fleet just to buy 400 or 500 Apaches? Don't call that reactionary thinking, it's entirely possible!

In relation to the December 1982 issue, I don't recall seeing so much wishful thinking in any previous *Digest.* LHX? Come on guys, we haven't even fielded the AH-64 yet! Further, what makes the authors think, in their hypothetical air combat scenarios, that threat nations won't upgrade their own low level attack systems? Sure, it's nice to think about ABC and NOTAR and acronyms ad infinitum (incidentally, is the criteria for having an article in the *Aviation Digest* the more new acronyms the better?) but hardly realistic when considering what spare parts will cost for the Apache alone, *and* what new weapons the Russians will come up with. All the new composite materials, advanced engines, digital avionics and on and on are really swell, but how much are they going to cost and can we maintain such sophistication, much less do we need it? The feasibility of LHX and similar aircraft smacks of Star Wars appetites in the face of Calvin Coolidge economics.

Finally, the Army had better get back into the fixed wing business if for no other reason than for cost effectiveness alone; Air Force lobbying notwithstanding. And be convincing about it! We can accomplish close combat air support better than the Air Force, and in many instances *have* done it better with B and C model Hueys. We can accomplish tactical air transport better than the Air Force, and *have* done it better with Caribous(before we lost them) and then Chinooks. We *can* accomplish low level battlefield air-to-air combat better than the Air Force given the *right* airplane and the *right* motivation and the *right* training. While the helicopter may have

its place in any role one cares to mention, remember one inescapable item: no matter what, it's NOT a fighter. I remain

CW4 James P. Fazekas
25th Avn Co (Corps)
APO New York

Editor:

I am a 15-year-old and my hobby is military aviation. I would like to correspond with someone who is in Army Aviation and who may be able to trade some badges. I will try to answer all letters.

Wilbert Mulders
Bachstraat 62
5g114 RT Venlo
The Netherlands

Editor:

I am interested in photos of past and present aircraft and aviation events of historical noteworthiness. I would appreciate hearing from anyone who has aviation related photos.

Billyfrank Morrison
P.O. Box 267
Ft. Campbell, KY
42223

Editor:

I have recently been made aware of a past request by your magazine for information on former Liaison Pilots (Army Artillery).

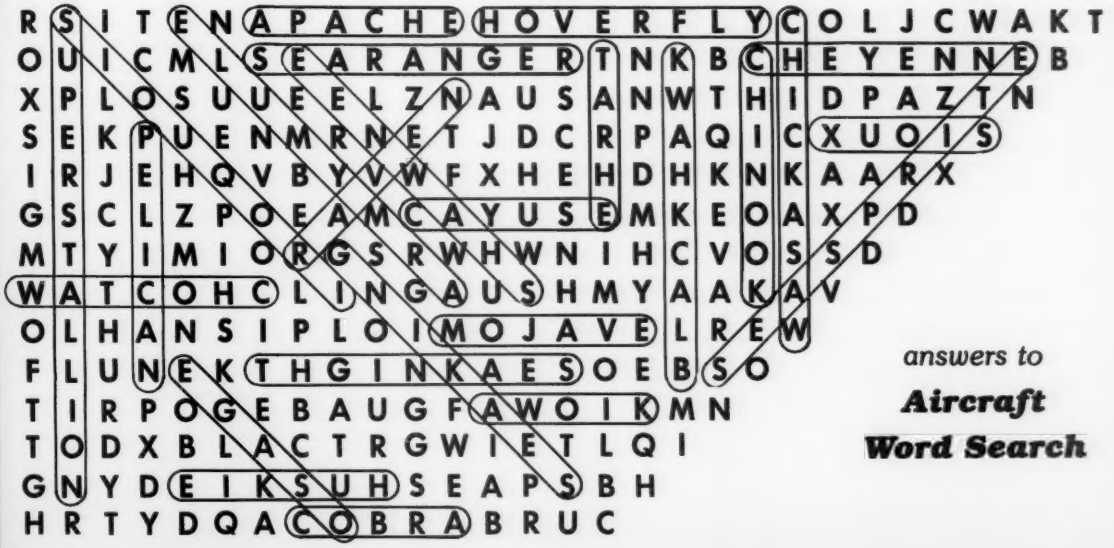
I am a retired colonel who attended flight school at Denton, TX, Class L-6, which was the first officer student class at Denton. It had been an Air Corps glider training station previously. The school was a contract school operated by Mr. George Hart. I later attended tactical flight training at Ft. Sill, OK, and was assigned to the 144th Field Artillery Group, 73d Field Artillery Brigade as aviation officer. I held this assignment until after May 1945, when I was assigned to the 11th Armored Division Artillery as aviation officer, replacing MAJ James Gregory.

I continued to serve in some capacity (Army National Guard mostly) and was retired in 1974. I served from 1960 to 1974 as supervisor, Transportation Aircraft Repair Shop, ARNG, Springfield, MO. This activity is now organized as an AVCRAD unit.

COL John D. McCory (Retired)
Springfield, MO

Articles from the *Aviation Digest* requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Ft. Rucker, AL 36362

AH-1 Cobra	**CH-21 Shawnee**	**CH-54 Tarhe**	**OH-23 Raven**	**TH-57A Sea Ranger**
AH-56 Cheyenne	**CH-37 Mojave**	**H-25A Army Mule**	**OH-58 Kiowa**	**UH-1 Iroquois**
AH-64 Apache	**CH-46 Sea Knight**	**H-43 Huskie**	**R-4B Hoverfly**	**UH-2 Sea Sprite**
CH-3E Pelican	**CH-47 Chinook**	**OH-6A Cayuse**	**SH-3D Sea King**	**UH-19 Chickasaw**
CH-34 Choctaw	**CH-53E Superstallion**	**O-13 Sioux**	**TH-55 Osage**	**UH-60 Black Hawk**



answers to

Aircraft Word Search

Listen to that Latin rhythm

U.S. ARMY SAFETY CENTER

IF CIRCADIAN RHYTHM sounds like some kind of ancient Roman rock group, check that high school Latin book again. "Circa" is a Latin word meaning about and "dian" comes from "dies" or day. If you've just said "so what?" your reaction is probably typical, but when your circadian rhythm, or internal body clock, gets out of sync a lot of things happen. There are more than 100 bodily functions affected by circadian rhythm; including, body temperature, blood pressure, digestion and kidney function.

Since you're in aviation, your interest in this subject will primarily be how it relates to performance. There are basically two types of circadian rhythm problems which affect performance—phase-shift and phase-point.

The now common term "jet lag" is related to phase-shift. Unless you've joined the "beautiful people" who follow the sun all over the world, you'll probably encounter jet lag when you deploy by "rapid transit." Rapidly crossing four or more time zones can totally confuse your internal clock (figure 1). If you have advance notice of deployment, it will help if you begin going to bed an hour or two earlier or later (depending on the direction you'll be traveling). Try not to fly for at least three days after you arrive to allow yourself time to adjust. (It would be ideal to allow one day for each time zone crossed.) If you must fly, be extra cautious. If possible, fly with a pilot-in-command or instructor pilot who has already compensated.

Most of us are more likely to encounter phase-point performance problems related to circadian rhythm. You are normally a diurnal animal (awake during the day and asleep at night). Your body temperature is at its lowest at some point in the night and your performance will be at its worst then. You may well ask, "So what's the prob-

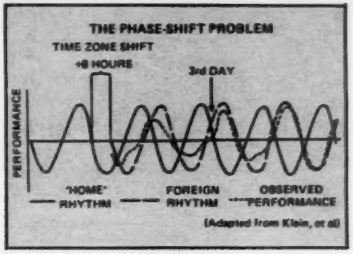


Figure 1

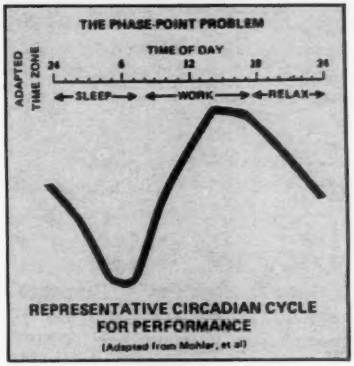


Figure 2

lem?" Well, here it is summer and the days are longer (including the extra hour of daylight saving time courtesy of Congress) with fewer hours of darkness. So where does that leave you? When you're trying to get in some night flying, it may leave you landing when your performance ability is definitely on the downswing (figure 2).

Right about now you may be thinking, "Okay, I've got to get in some night flying so I'll just stay up and catch the late show and sleep in a couple of hours tomorrow morning. That'll fix the ole rhythm and I'll be in great shape for tomorrow night's mission." Not so, you don't just reset your body clock whenever you need to be bright-eyed and bushy-tailed. You can adjust your circadian rhythm but it has to be done gradually. Industry has discovered that regularly rotating factory workers from day to night shifts for short periods of time is the worst thing to do. They have more accidents and production falls off because they never have time to adjust to either cycle. If you only fly occasionally at night, obviously you won't have time to adjust to a totally different rhythm. But just being aware that you aren't at peak performance will give you a chance to compensate.

While you can't adjust your circadian rhythm to every schedule change, there are some things that affect your flying peformance which you can control.

FATIGUE. There are generally two types of fatigue, acute and chronic.

Acute fatigue is short-term but you can fall victim to it without really being aware of what's happening. For instance, most people tend to be more physically active during the summer months. That's good, exercise is a good stress reliever, but if you work a full day, jog at noon and then mow the grass and take the kids swimming in the afternoon before you hit the flight line for a night mission, you may be starting a pretty good case of fatigue. If you keep that kind of schedule going and regularly cheat yourself of sleep, you could wind up with acute fatigue.

Federal Aviation Administration (FAA) research shows that short-term fatigue affects your flying skills by disrupting your timing flow and perceptual field. When fatigue disrupts your timing, you'll seem to perform your tasks as usual, but the timing of each element will be off slightly. You'll have to do each element individually instead of as a unified whole. For instance, you'll have to concentrate harder on coordinating stick and throttle movements that would come naturally if you weren't tired. Your perceptual vision field is disrupted as you focus your attention upon what's in the center of your vision and ignore what's on the periphery. This tunnel vision is usually accompanied by roughness and loss of accuracy when you move the controls.

When you are fatigued you may not notice warning signals as quickly as you normally would. An instructor pilot on a UH-1H had been on duty for 35 of the last 48 hours and had been heard to complain of being tired. During a night terrain formation flight, the pilot was flying at 40 knots, 100 feet agl. He initiated a descending left turn as a result of spatial disorientation. The IP was not functioning at his normal level of competence because of fatigue and he failed to detect the maneuver until it had progressed beyond the point of recovery. The aircraft crashed and was destroyed. All occupants were killed.

Chronic fatigue is a long-term problem, often with psychological roots, and it is frequently induced by continual stress. It isn't hard to imagine it happening to you if you've already been passed over for promotion once and your superior officer is letting you know in no uncertain terms, every day, that he thinks you aren't measuring up. When your ability, intelligence (and sometimes even your legitimacy) are constantly questioned you become a candidate for chronic fatigue. You could probably handle that but if you've been having family problems for some time and then you begin having financial difficulties, you may well be on your way to chronic fatigue. People vary too much in their ability to deal with stress for anyone to say just how much you can take before you fall prey to chronic fatigue but if you're having serious problems, both your commander and the flight surgeon should be consulted early on.

During an autorotation from 2,500 agl and 70 KIAS the maintenance test pilot (MTP) on a CH-47C permitted the copilot, who was on the controls, to delay corrective thrust application resulting in rotor overspeed before he could recover rotor control. The aircraft landed without further damage. The MTP had been under pressure because of his unit's maintenance

posture. The maximum flyable aircraft would be required for an upcoming field exercise and he had been working long hours without time off. Chronic fatigue was suspected as a cause for his reduced alertness and efficiency.

Paragraph 2-12, AR 95-1, "Army Aviation: General Provisions and Flight Regulations," requires that a crew rest program tailored to the unit mission be included in standing operating procedures. Table 2-3 provides guidance to commanders for scheduling maximum flight time for personnel based on environment relative factors. Advice of flight surgeons and aviation safety officers should be considered when setting limits for specific operations or time periods.

DIET. A well-balanced diet is particularly important to aviators. When meals are skipped, the resulting low blood sugar leads to fatigue. A snack which is high in simple-sugar, such as candy, may trigger release of insulin. The insulin carries sugar into the skeletal muscle cells to be used for energy. When this happens the brain is deprived of blood sugar, its only source of energy, and that can lead to "sugar shock." Symptoms of sugar shock include, mental confusion, nausea, numbness and tingling, headaches, disturbances in speech and vision (the field of vision narrows and peripheral vision deteriorates), a collapsing sense of fatigue, lightheadedness, muscle incoordination and sometimes even fainting spells.

On the last day of an Army Training and Evaluation Program (ARTEP) the pilot of an AH-1S had flown nap-of-the-earth over snow-covered terrain for 5 continuous hours. While searching for enemy tanks, he stopped forward flight and hovered. The aircraft drifted aft and the tail rotor struck a 50-foot tree. The tail rotor drive shaft was severed due to torsional loading and antitorque control was lost. The aircraft landed hard and damage amounted to $175,000. This pilot had been on 2 weeks of field duty and was under physical and mental stress caused by serious personal problems. On the day of the accident he had eaten a granola bar, half a turkey sandwich, orange juice and two cups of coffee. His blood sugar level measured 39 (normal is 70 to 110).

While you should not skip meals, neither should you overeat before flying. Digestion and absorption of food requires large quantities of blood and the remaining body functions tend to relax during this process. Overindulgence may make you feel drowsy.

There are some foods, or combinations of foods, which researchers believe to be "sleep-causing." The body makes a chemical compound called serotonin from a nutrient substance found in milk and many other foods. This nutrient is one of the building blocks of protein, an essential amino acid called tryptophan. When concentrated tryptophan is taken with a high "carbohydrate" meal, a drowsy sensation results. Tryptophan has been classified by the Food and Drug Administration (FDA) as "generally recognized as safe." The concentrated form is available at most health food and drugstores and its use is becoming more common among the medical community as a natural sleeping aid. Average doses are 2 to 4 grams but some adults have experienced drowsiness with as little as 1 gram.

Researchers have not completely resolved whether the ½ to 2 grams of tryptophan found naturally in a normal daily diet causes a similar sleepy sensation. The effect would probably not be a powerful one but rather gradual, like hypoxia. In that sense, low-grade drowsiness could be dangerous in flying operations. High protein, low carbohydrate meals should be substituted for high carbohydrate foods before flying. This may sound strange since tryptophan comes from protein but it is

Table 2-3
Crew Rest Scheduling Guide

1 Time Period Hours	2 Maximum Duty Period	3 Maximum Flight Time*	4 Environment relative Factor	
24	16	8	Day	1.0
48	17	15	Day terrain contour	1.0
72	37	22	contour	1.3
168 (7 days)	72	37	Night	1.4
720 (30 days) (Peace)	288	90	Instrument	1.4
720 (30 days) (Mobilization)	360	140	Day NOE	1.6
			Night terrain/Night Hawk	2.1
			Night Vision Devices	2.3
			Chemical MOPP-4	3.1

Example: The stress and fatigue experienced in 1 hour of day NOE flight is equal to 1.6 hours of day standard flight. Two hours of instrument flight and 2 hours of night hawk flight are equal to 7 hours day standard flight, (2 x 1.4) plus (2 x 2.1 = 7). All flight time should be converted to day standard and applied to the scheduling standards of columns 1, 2, and 3 above.

***The flight time shown in column 3 will be adjusted by the factors in column 4.**

not so much the tryptophan-containing protein that is the problem, it is rather the carbohydrates taken with the protein. Carbohydrates release insulin which dramatizes the effect of tryptophan.

CAFFEINE. Watch the amount of caffeine you take in each day. Caffeine, found in coffee, tea, and certain soft drinks, is a stimulant but its effect is short-lived (normally 3 to 5 hours). After the effect wears off your level of alertness will be lower than normal. Of course you can always drink still another cup of coffee and your level of alertness will be brought back up but it will never reach its previous level. The more caffeine you drink, the farther you drop behind.

ALCOHOL. Even if it has been 12 hours or more since that last drink and all of the alcohol is out of your blood, it has a lingering "hangover effect." That is just another kind of fatigue and one you don't need.

The pilot of an AH-1S (MC) had consumed alcohol within the last 72 hours and had been the driver in an automobile accident (which hadn't been reported to military authorities). He was debilitated and suffering from some upper torso muscle soreness. While returning to his home field at night, 680 feet agl and 120 KIAS, he inaccurately estimated his clearance and closure to the ground during an emergency forced landing due to engine failure. After entering autorotation and turning left, he reduced his airspeed to zero and applied collective at approximately 100 feet agl. The aircraft fell vertically with extremely low rotor rpm, hit the ground with nonsurvivable force and burned.

SMOKING. Don't add to your performance problems by smoking. The more you smoke, the more hypoxic you become and the less oxygen goes to your brain. The less oxygen your brain receives, the more your performance suffers.

Now that you know there are times when your performance simply isn't at its best because of your circadian rhythm and you are also aware of some things you can avoid so as not to make the problem worse, let's talk about something that demands a great deal of any aviator—*field training.* The hours are long, sleeping conditions aren't the best, the food probably isn't what you'd like it to be, and the missions tax your physical and mental resources.

At 2345 on the second night of an ARTEP the pilot was preparing to lead a flight of five aircraft to a new landing zone. After a 30-minute delay, the OH-6A took off on its tactical training mission. The pilot had had 5½ hours of restless sleep the night before and was up at 0330. He had performed platoon leader and flight duties that day in unaccustomed 115-degree heat. He failed to perform a maximum performance takeoff from the dusty parking lot as recommended by Training Circular 1-13, "Hot Weather Flying Sense," and sustained a hover in an instrument meterological condition (IMC) for approximately 20 seconds, losing his outside visual references. He briefly turned on his landing light in an attempt to regain visual references and this led to deterioration of night vision. The pilot failed to perceive that his aircraft was drifting until it struck a tree and came to rest on its left side.

You can't schedule your flying around your circadian rhythms and you can't avoid all circumstances which lead to fatigue (field training and night flying are part of the soldiering business). You can, however, avoid multiplying your liabilities so that they substantially subtract from your chances of flying and coming home safely. Get all the rest you can, eat sensibly and avoid excessive use of caffeine, alcohol and tobacco. Make adjustments to compensate for fatigue and if you know that you're under a lot of stress, ask for help—it's the smart thing to do.

You know yourself better than anyone else. When you know you aren't at your best, don't depend on flying skills to get you through. Use good judgment, make sound decisions and leave the more complicated tasks for another time. To borrow from a popular TV series, "Hey, let's be careful out there."

REFERENCES

"Do You Have The Rhythm Blues??" March 1981, *Flying Safety*

"Night Flying & Fatigue," November 1982, *TAC Attack*

"Who's Sleepy?" February 1983, *Flying Safety*

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Bennie Duhaime photo by Elaine Greene

PEARL'S Contribution To Safety (Personal Checklist)

Full credit for this article extract is given to *Combat Crew* magazine, the Air Force Strategic Air Command and CPT Rhett T. Cooper, 1st Combat Evaluation Group, Barksdale AFB, LA.

Aircraft accident statistics show that pilots should be conducting a preflight checklist on themselves as well as their aircraft, for pilot impairment contributes to many more accidents than do failures of aircraft systems. A personal checklist can easily be committed to memory and covers the more common categories of pilot impairment.

I'm physically and mentally safe to fly—not being impaired by:

Simply put, when it's time to fly and the body doesn't seem just right, stay on the ground. This is one aspect of the mission where only you can help.

Alertness. Be alert at all times, especially when the weather is good. Most of us pay attention to business when operating in full IFR weather conditions, but strangely, air collisions almost invariably have occurred under ideal weather conditions. Unlimited visibility appears to encourage a sense of security which is not at all justified. A very important time during the mission to be fully alert is when operating in the terminal area. We can help "keep it safe" during this critical phase of flight by maintaining a close "listening watch" on the radios. Considerable information of value may be obtained by listening to advisories being issued in the terminal area, even though controller workloads may prevent a pilot from obtaining individual service.

Ballpoint Pen Cheats Seat

I know that normally we do not fly the OA-37 aircraft, but since it is always a remote possibility I thought the following article from the *TAC ATTACK* would prove interesting with the bottom line being: If it can happen, it is best to be aware of it.

A two-man aircrew finished their mission in an OA-37 and were ready to climb out of the cockpit when the copilot found that he couldn't release his seatbelt. He finally freed himself by loosening all his straps and squeezing out. It was a good thing he hadn't needed to eject or to climb out quickly in an emergency. In an ejection, the pilot could not have separated from the ejection seat.

The seatbelt was taken out of the airplane and broken down. The tip of a ballpoint pen was jammed in the mechanism. Apparently, in order to secure the right seat for solo flight, someone had "cheated" the gold key locking mechanism by inserting a ballpoint pen. When the pen was pulled out, its tip came off and stayed in the mechanism. The pen tip may have been in there for quite a while before it worked its way into the lock release.

Both air and ground crews regularly secured the right seat for solo flight. We'll never know who used a ballpoint pen to defeat the latch, but the problem of bypassing the requirement to insert a gold key was well known. No one took the time to develop a safe, standard procedure to solve the problem. After this incident the unit developed a locally produced gold key with a red streamer attached. *Now* there is *a right way* to do it.

Fire Extinguishers

This is a followup on the article that appeared in the December 1982 issue of *Aviation Digest.*

Further investigation into this matter shows that the 16 pound Halon type fire extinguisher (NSN 4210-01-092-3263 LS) is not a true replacement for the 50 pound CO_2 fire extinguisher due to the lack of mobility and handling problems. It could be used, however, if you had a storage facility in which to place it after use.

Another approach to your problem would be to submit a DA Form 2028 on TM 55-1500-204-25/1 with your specific comments which would initiate an engineering evaluation in order to provide a more suitable fire extinguisher. The mailing address for the form is located in chapter 1 of the manual. Questions concerning this may be addressed to 1LT (P) Greta Weaver, DRCPO-ALSE, AUTOVON 693-3307.

Light Sticks

Dear PEARL, can you tell me how and where to order the cyalume light sticks? I understand they come in several sizes.

The cyalume light sticks are available from either General Services Administration or they can be secured through the normal supply system as they are identified in the Army Master Data File. These are the correct stock numbers: NSN 6260-00-106-7478 will get you the 4 inch general purpose one; NSN 6260-01-074-4229 will get you the 6 inch, 12-hour general purpose one; and last, NSN 6260-01-074-4230 will get you the 6 inch, 30-minute high intensity light. Actually the light will last 24 hours, but it has a high intensity for a minimum of 30 minutes.

"Down To Earth"

This article is reprinted from *TAC ATTACK,* a U.S. Air Force publication.

The last bout of diarrhea and fever you dismissed as "a bug going around at work" could have come from your bag lunch. If care is not taken while preparing food, bacteria can grow in it and cause food poisoning. Because bacteria thrive at 60 to 120 degrees Fahrenheit, a good rule to follow is to keep cold food cold and hot food hot. Don't set your lunch bag on a warm radiator, windowsill, or either the dash of your car or next to your aircraft windscreen. Either put your lunch, bag and all, in the refrigerator or protect the food by putting it in a thermos bottle.

Some foods are safer than others. Dried meats, such as pepperoni and beef jerky, keep longer. So do fully cooked meats, such as salami, franks and bologna. Hot foods will stay safe if they're put into a vacuum bottle while still boiling hot.

The best way to keep bacteria from growing in the brown bag is not to use one. Metal lunch boxes, especially the insulated kind, are much better at keeping food cold. If you do use the brown bag, be sure you throw it away after one use. Using it again only gives bacteria more time to grow inside and contaminate your lunch.

Suspected Contaminated Water

Change 1 to NAVAIR 13-1-6.5 dated January 1983 has come out with the following warning:

Point of contact for this office is Mr. Ed Daughety, DRCPO-ALSE, AUTOVON 693-3307.

ALSE Pamphlet

The new ALSE pamphlet is finally here! We apologize for the long delay and are working to get these out to you the user as soon as possible. You ALSE officers and technicians can help by sending us your current address on a post card in the following format.

COMMANDER
(your unit)
ATTN: (your name)
(ALSO or ALSE technician)
(station)_____(zip)_____

We hope this pamphlet will give you the most up-to-date information and data for your ALSE program. If there are any questions concerning this matter, our point of contact is 1LT (P) Greta Weaver, DRCPO-ALSE, AUTOVON 693-3307.

If you have a question about personal equipment or rescue/survival gear, write PEARL, DARCOM, ATTN: DRCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120 or call AUTOVON 693-3307 or Commercial 314-263-3307

Illustrations by Fred Martin

A Reading from the FIRST BOOK OF RUCKER

In the beginning was Mother Rucker and she was filled with hope. And her hope turned to thought and her thought to idea and her idea she called "helicopter." And she said, "This is good." And there was evening and there was morning on the first day.

Now on the second day, Mother Rucker awakened and she was bored, for although her helicopter was good, it needed something. So she put out a call for men and women, strong of heart, pure of spirit and free from bad checks, to come and join with her fine machines in an experience called "aviation." And Mother said, "Let all the aviators under the heavens be gathered together into one place, and this place shall be called 'Ft. Rucker.' " And her call reverberated through the halls of DA until the word was spread. And they came—meekly at first, and then boldly in droves as the bee seeks the flower, from the far corners of the globe—from the wildlands of Missouri to the outbacks of Montana, from the farms of Hungary to the skyscrapers of New York.

As they arrived they were issued their battle gear: Whiz wheels and kneeboards, flight helmets and Nomex gloves, flashlights and earplugs. And those from the land of the National Guard were issued haircuts. And those from the land of the Air Force were issued haircuts and shined boots. And all this was free. And they said, "This is good." And there was evening and there was morning on the second day.

DAY 3

Now on the third day, Mother Rucker felt that it was time for her recruits to be united with flight and yet she did not wish to waste her truly great aircraft on this mere plebeian caste. So she began their training by placing them in a device called the TH-55, or as she so often referred to it, the "Mattel Messersmitt," an aircraft driven by eight rubber bands. Originally she had created the TH-55 as a new food processor for her kitchen, but when she discovered the tremendous mess it made with egg whites, she gave up and converted it to an aircraft. And so it was that this creation was united with recruits from the far corners of the globe.

And the training did begin. And the recruits heard terms such as fully articulated, oleo struts and dampers. And for the first time the recruits did wonder and shake with the spirit. And they learned what a pilot's briefing was, and they learned what stagefields and traffic patterns were, and they did marvel at these terms. And so they began to fly. Now some fell upon the rigors of academics and did wither on the vine, and some fell (I mean *really* fell) from poor preflights and were choked among the thorns, but some fell upon fertile soil and did soar and hover as Mother knew they would. And she was pleased, but it was not enough. So, she told the recruits that they would be challenged to try a maximum performance takeoff, and they did, and a hovering autorotation, and they did, and a standard autorotation, and they did, and a standard auto with turn, and they said, "You gotta be kidding me!" But eventually they succeeded, for as the moth seeks the flame, as the fish seeks the water, as the dog seeks the bone, so too did the recruits seek their wings.

Now all of this was done under the watchful and tender care of Mother Rucker's disciples, the IPs. And these IPs were filled with knowledge and wisdom, and they did cause their students to quiver with fear. And the students did try, but many were their mistakes. And their mistakes did multiply as do the rabbits in the spring. And the IPs did turn to their students and say, "You hear but do not understand. You see but do not perceive. For your hearts have grown dull, and your ears are heavy of hearing."

And this filled the students with grief, and they did turn to the prophet's disciples for healing. And the IPs said, "Many righteous men have longed to see what you see, and did not see it, and hear what you hear, and did not hear it."

And the students said, "Yes, that makes sense."

And so as they heeded the words of their IPs, the students were cured of their transgressions, and they became hungry for more knowledge, for they had been separated from the many that had come to this paradise as is the wheat separated from the chaff. And all this was done so that Mother could be proud. And there was evening and there was morning on the third day.

DAY 4

On the fourth day Mother Rucker saw that all was not kosher in the land of Rucker. Her pilots had forsaken the arduous study of the TH-55 and the dash 10, and their hearts were filled only with the evil thoughts of the O. Club's informal lounge and dens of iniquity. For the trials of flight had grown easy and soft. But there walked on the earth an upright soul not corrupted by the fully articulated rotor and oleo struts, who found favor with Mother Rucker and this man was called Huey. And Mother said unto Huey, "I have determined to make an end of such ease among my pilots, and thou shalt be my instrument of divine retribution. Make thyself a craft of duraluminum with tailboom and cabin section and landing gear. And this is how thou shalt make it: It shall be 40 cubits long, its breadth, 8 cubits 6.6 inches, and finish it to a 48-cubit rotor disc diameter above. It will have one floor and shall not exceed 40 shekels of brass at max gross weight."

And Huey said, "What's a shekel?"

And Mother said, "Never mind. For behold I shall bring forth a flood of changes to the dash 10 and destroy all free time that is upon the earth for these pilots."

And Huey did all that Mother Rucker commanded and shewed unto her an incredible new flying machine. And Huey took this creation and landed on a pinnacle, and on this pinnacle Mother Rucker appeared to Huey in a glowing cloud of exhaust gas intermixed with rotor wash. And Mother said unto Huey in setting forth the structures for the operation of this machine, "You shall carry forth rules and regulations which will be strictly adhered to at all times. You shall call these rules 'Commandments.'"

Huey was somewhat irreverent in this regard and decided to call these commandments checklist items instead. And this pleased Mother. Huey then went down from the great pinnacle which was called "Lowe" and sought those sinning new pilots in there usual abodes and found them in the midst of great revelry in the O. Club and in honky-tonks. And he confronted and rebuked them. Then he said, "These are Mother Rucker's Laws of Aviation, and thou shalt follow

them for all the days of thy lives while flying my machine."

And Huey spoke of preflight inspection, before starting engine, starting engine, engine runup, hover, before takeoff, before landing, after landing, engine shutdown and before leaving the helicopter checks.

Now elsewhere in the land were IPs who had become old hands at the business. They were air worshippers who harkened in part to the teachings of Mother Rucker but twisted the teachings in places so as to become different at each period of worship. And their hearts were full of pride and trivial questions at all of the knowledge that they had assimilated. And it was in those passing days that the students did learn of autorotations at low level and compressor stall and stuck left or right pedal. And Mother saw that it was good and becoming better with every change to the dash 10. And there was evening and there was morning on the fourth day.

Now on the fifth day, Mother Rucker was ill and hid her face from the earth. There were clouds, scud layers, light drizzle and fog upon the firmament. All of the students did tremble and wonder that they could not fly. And Mother did see this and knew that it was not good and so she created "instruments." There were also in the land of instruments "pink slips"—to be avoided, because the pink slips flew almost as often as did the students. And the students *really* trembled! And it was about this time that the voice of the IP would crackle through the doom and say, "Now watch me fly this back course ILS on emergency panel using only the free air temperature gauge." Mother saw all of this and she said that it was—"adequate." And there was evening and there was morning on the fifth day.

On the morning of the sixth day Mother Rucker saw that her pilots could cheat death during the light and that it was good. But she thought, "My pilots must have more challenge!" Mother remembered that she had seen the light and *also* the darkness. She knew the Army would not buy "Night Flight," so she called the darkness "Night Hawk." Mother decreed, "Thou must avoid dynamic rollover during night slope operations and pinnacles, and ye shouldst not fear low level autorotations whilst skimming the tree lines and not seeing the entry point. Ye must learn to hover and ground taxi, not at 10 feet, but at 3 feet—and not sideways or backwards—but in a straight line."

And it came to pass in that way. She said also that they should not fear entering the traffic pattern the wrong way just because they couldn't tell where they were. And the pilots overcame even that. But in time Mother saw that the pilots were hungering for still more things, including a way to see. There were too many near midairs, too many tail stinger strikes, too many visual illusions to which mere mortals were subject. And so Mother said, "I will make for my pilots a nighttime helper, and I shall call that helper 'Night Vision Goggles.' "

And here she had problems. But not to fear, for the pilots took quickly to these devices. So, she caused them to wear the creations 4.5 hours. Despite the neck and headaches, the sweaty faces and the straining eyes, she knew that her intrepid airmen could overcome—and they did. And she said, "Atta-boy!" And there was evening and there was morning on the sixth day.

On the seventh day Mother Rucker looked and saw that she had created helicopter pilots, and that was good; but she realized that she needed aviators, not just pilots. And the pilots took another view, saying, "Blessed is the seventh day because on it we shall rest." But Mother said, "There is not rest for the Army Aviator," and lo, she harkened them forth from the O. Club to

learn of "tactics." And she said to them that the aviator should not be alone upon the firmament and so she caused the firmament to move, and from it she brought forth eighteen 1:50,000 scale topographical maps. And she placed them in a stack and this stack was without form and void. And she gave her pilots a jar of rubber cement, and she said unto them, "Breathe into this mass life and spirit for they will be the word and the way."

And they gave birth to ACP Smith which begat Henderson, which begat Joyce, which begat Amy, and on and on until there was Runkle. And these gems were hidden far and wide across the land and were called LZs. And the LZs were moved every night so that they were never in the same place that they were the day before. Mother then struck her pilots dumb and sent them into the wilderness for 40 days and 5 nights. And in the wilderness the IPs did tempt the pilots mightily to follow the wrong routes by making all stream beds appear identical. But the pilots said, "We fear not, for it is written that man shall not navigate by stream bed alone, but by every terrain feature on the map."

And the IPs did tempt them again by laying before them all of the tasks they had mastered and commanded them to choose from among them for the final checkride. And the pilots answered, "Get thee behind me evil IP, for it is written, 'Thou shalt worship the autorotation, and the night flight, and the night vision goggles, and we shall serve them in our final days.'"

And the IPs said, "Lest thou forget about instruments, let's see some tactical instrument approaches."

So as a final test the most difficult aspects of the earlier phases were brought to bear upon the pilots and they responded, "We shall fear not, for we have been to the mountain top, and have seen the glory of the coming of our wings!" And after the final checkride the pilots answered unto their IPs and said, "Thou shalt tempt us no more for we are Aviators!" And it was the evening of the seventh day and Mother Rucker smiled and said, "At last."

These are the tales of the creation of the helicopter and its pilots. For in this time Mother Rucker had planted the seed of the tree of rotary wing knowledge and her students were bold enough to taste of the forbidden fruit of this tree. And Mother said, "Because thou hast done this, thou art cursed with aviation in your blood, and shalt be turned away from this place in paradise to roam throughout the earth—back to your National Guard units, and across such exotic lands as Alaska, Germany and Ft. Bragg. And in your travels you shall be called upon to face every beast of the field and of the air, and to do battle with such as the Cobra, the Black Hawk, the Chinook and the buzzard." And so brethren, because of the dangers involved, before departing this holy ground that is Rucker, let us all join in that hymn of everlasting praise that our beloved Mother Rucker taught:

RPM 6600
SYSTEMS CHECK
CREW, PASSENGER AND MISSION EQUIPMENT—SECURE
LANDING LIGHT—AS REQUIRED

STEP 706: FOLD HERE

This article is a modification of a skit written by the authors below, for presentation at the graduation ball of Initial Entry Rotary Wing Class 80-12 at the U.S. Army Aviation Center, Ft. Rucker, AL:

Captain Mark G. Dykes
Captain Leonard Samborowski
Captain Randall Robertson
Captain Mark Tarman

Attention All Aviators.

A. Check your Officer Record Brief to ensure that it reflects the correct aircraft qualifications in Section I under the "Aviator/Gunnery Qualifications" block. When your assignment officer needs a fixed wing (or UH-60 Black Hawk or CH-47 Chinook, etc.) rated aviator, he or she will check your ORB to see your qualifications. If you need an addition, see your SIDPERS clerk or servicing military personnel office.

B. While we are talking about ORBs—take a look at your pilot status code. It is also located in the "Aviator/Gunnery Qualifications" block. You should see a 1, 2, 3 or 4. The definitions can be found in AR 600-105 and are summarized below:

PSC 1—qualified for aviation service.

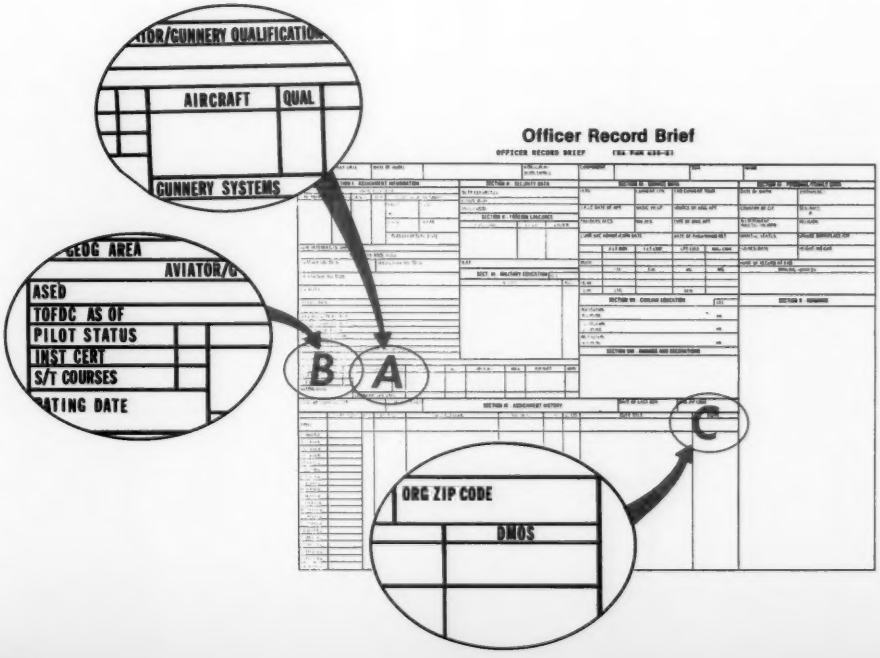
PSC 2—medically disqualified.

PSC 3—nonmedically disqualified.

PSC 4—not in aviation service.

You must have a PSC 1 to: fly; draw Aviation Career Incentive Pay (except for a 6-month grace period following medical disqualification); or accumulate operational flying duty credit.

C. As long as you have your ORB out and are in an investigative mood, take a look over in Section IX, "Assignment History." All the way over to the right is a column titled "DMOS" which shows your current and past duty MOS. This nine-digit code is also referred to (in AR 611-101) as a position requirements code. If you are flying, your PRC must have a 15, 71 or 67J in the first two (three in the case of Medical Service Corps aviators) positions. Furthermore, there cannot be a "1X" in the 6th and 7th positions.



Officer Record Brief

MONTHLY WRITING AWARD

THREAT

Mr. Ed Bavaro
Threat Branch
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

Soviet Attack Helicopters - King of the hill?

I'LL BET YOU'VE heard discussions like this several times in the past few years: "OK, OK!!" So the Hind is good...but our technology and our experience with helicopters on the battlefield give us the edge, right??" The significance in that kind of dialogue is that 10 years ago the employment of helicopters in combat was practically the sole province of the U.S. Army. Comfortable in our preminence as the undisputed world leader in the evolution and implementation of airmobility, we were expanding attack helicopter roles including formation of the Air Cavalry Combat Brigade. Even after the 1973 Mideast War and the preview of the high threat environment it provided, our refinement of combined arms tactics merely paid lip service to threat helicopters. While most viewed the threat to Army Aviation as being ground-oriented, those perceptive few who contemplated facing threat attack helicopters were "discouraged" from making reference to air-to-air engagements between helicopters. But the emergence of the Hind, especially the Hind-D in 1976, opened a lot of eyes and underscored the great strides the Soviets have made with rotary wing aircraft.

How did they get there? How did they manage this seemingly quantum leap to prominence in the attack helicopter arena? The facts surrounding the Soviet progression to the Hind series and the integration of attack helicopters are not as dramatic as one might think.

The Soviets have had a long and continuous interest in helicopter development. Until the late 1960s, however, their developmental efforts were directed toward logistical support applications vice the combat roles so evident today. The Soviets considered the helicopter too vulnerable to operate in a midintensity environment or near the forward line of own troops exposed to hostile fire.

Soviet interest was aroused, however, by the increasing United States' emphasis on helicopter airmobility. They closely examined our use of the helicopter in Vietnam, and numerous helicopter articles began appearing in the Soviet open press. The principal author of these articles, Colonel M. Belov, used the review of Western use of helicopters to focus Soviet attention on the advantages of using helicopters for a variety of missions. His writings set the tone for the Soviet doctrine and tactics we are seeing in use today, and these tactics closely follow our thinking on helicopter employment.

The Soviet preoccupation with the offense made the armed helicopter a logical progression as a means to sustain the tempo of offensive operations. Additionally, the ability to provide troop mobility, responsiveness

CONSOLIDATED GLOSSARY—Page 35

Mi-24 Hind-D/E Armament

- ☐ Four barrel Gatling-type 12.7 mm MG in nose turret (Hind-D/E) or two barrel 20 to 30 mm cannon (Hind-E)
- ☐ Four Swatter ATGMs (Hind-A/D) or four Spiral ATGMs (Hind-D/E)
- ☐ Four 32-round, 57 mm rocket pods or four bombs

Mi-8 Hip-E Armament

- ☐ Capable of carrying six 32-round, 57 mm rocket pods or other weapons on bottom racks
- ☐ Four Swatter ATGMs mounted on upper racks
- ☐ Swivel-mounted 12.7 mm MG in the nose

and firepower in rugged and remote areas, especially some areas on their borders, spurred Soviet developmental efforts in airmobility and helicopter armament.

To provide that firepower element for airmobile forces, the Soviets initially equipped transport helicopters with "strap on" armament packs much as we did with our UH-1C Huey helicopters. The most notable of these modified transports are the Mi-8 Hip-C and Hip-E. Initially, the Hip-C was armed with rockets to provide support to airmobile forces by providing suppressive fires to complement their ability to stay and fight. The latest version of the Hip-E has been described as the most heavily armed helicopter in the world.

Today, however, center stage is reserved for the acknowledged current star of attack helicopters—the Mi-24 Hind-D/E. The Hind was originally conceived in the 1960s as a pure attack helicopter for the Soviet Air Force but several influential Soviet staffers prevailed in the view that a cargo bay for logistical applications was required. This also was a hedge against a single purpose asset which was viewed as militarily ineffective and risky.

Nevertheless, the evolution of the Hind, optimized as an attack helicopter, has been impressive. The early Hinds served to establish the value of the attack helicopter in Soviet close air support operations and instilled confidence in their newly developed approach to attack helicopter tactics and doctrine. The result of their accumulated knowledge, combined with evolving technology, produced the Hind-D in 1976 and the Hind-E in 1978—an extremely potent weapon system which presently has no equivalent in the West.

The Soviets view the problem of helicopter fighting being resolved on the basis of integrated use of different combined arms weapons and tactics. Helicopters, representing a significant element of unmatched mobility and impressive firepower, are now considered an indispensable part of modern combat.

AH-1S Cobra Armament

- ☐ 20 mm cannon
- ☐ Four TOW ATGMs
- ☐ 14 2.75 inch (70 mm) rockets

AH-64 Apache Armament

- ☐ 30 mm cannon and 16 HELLFIREs or
- ☐ 8 HELLFIREs and 38 2.75 inch rockets or
- ☐ 76 2.75 inch rockets

Soviet helicopters have benefited from a variety of combat experience. They have had exposure in North Vietnam and Laos, and in Ethiopia where Russian crews flying helicopters helped ensure the defeat of the Somali Army. Both sides of the 1971 India-Pakistan War used Soviet helicopters in medical evacuation and troop-carrying roles and widespread use of Soviet helicopters has been documented in the 1973 Mideast War. Syrian commandos landed from Mi-8s and captured the strategic fortress and observation post on the 7,000 foot Mount Hermon, on the opening day of the war and the Egyptians used Mi-8s for a diverse array of missions.

Currently, the helicopter is proving invaluable to the Soviets in the rugged terrain of Afghanistan. Accounts of Soviet operations within Afghanistan refer, almost without fail, to the extensive use of the helicopter, especially attack helicopters.

Soviet commitment to the attack helicopter is evidenced by the accelerated production and deployment to the field of more than 1,100 Hind-Ds and Hind-Es. Since 1970, the Soviet tactical helicopter inventory has doubled, with more than 70 percent of the total comprised of armed Hips and Hinds. While the Soviets are continually testing, refining and adapting attack helicopter tactics and organizations, they presently employ organic attack helicopters in the division helicopter battalions and have numerous independent attack helicopter regiments.

The missions they see for the attack helicopters include:

- close air support
- ground attack, antiarmor operations
- antihelicopter operations
- commando missions
- transport of antitank squads
- escort for heliborne forces
- armed rescue.

Practical application of these missions is being eval-

Since 1970, the Soviet tactical helicopter inventory has doubled, with more than 70 percent of the total comprised of armed Hips and Hinds.

uated by the Soviets in Afghanistan just as we had done in Vietnam. Interestingly enough, when they invaded Afghanistan, their aviation assets were predominantly fixed wing. After cutting their teeth for a period, the Soviets now have an air order of battle in Afghanistan that primarily consists of rotary wing aircraft.

The Soviets are now undertaking reconsideration of their policy of consolidated air force control of aviation assets. Factors prompting this review are the nuclear threat, better communications, and probably most important of all, the growing appreciation and recognition of helicopter capabilities. The emerging doctrine will seek to maximize the versatility of the helicopter (especially its responsiveness, mobility and firepower), and decentralization of frontal aviation helicopter units may be the way to achieve it.

Another aspect of Soviet military doctrine holds that if war breaks out in Europe it must be won quickly. A key to this goal may be their use of recently added formations of Operational Maneuver Groups. These groups are division size or multidivision size, depending on the scope of intended operations. They are committed early during the first days of the war to drive deep into the enemy rear for possible linkup with airborne or air assault forces. One of the most significant aspects of the concept of the OMG is its reliance on air support and helicopters, particularly the attack helicopters which are absolutely pivotal to the success of the OMG.

The intent of the OMGs is the destruction of command and control, communications, and nuclear stocks and weapons, capitalizing on the initial hesitancy of NATO forces to use tactical nuclear weapons. After nuclear weapons, attack helicopters are said to be one of the greatest threats to the OMG. For this reason, according to C. N. Donnelly in a recent *International Defense Review* article on the OMG, "The Soviets are expected to shortly deploy a new helicopter which has been designed to combat the helicopter threat."

So how did they get there? By doing their homework, the Soviets observed and recognized:

- Our success with armed helicopters in Vietnam and particularly our increasing commitment to dedicated attack helicopters.
- Many of the other NATO nations were aggressively developing programs to field attack helicopters.
- Refinement of helicopter tactics and technological advances notably reduced the vulnerability of the helicopter and increased its survivability and combat power.
- That airmobility could fill the voids in areas inaccessible to armor and motorized rifle forces.

In the face of such free world activity toward heliborne fire support systems, the Soviets in the final analysis really had no alternative but to respond to this *new* form of threat.

As to who is "King of the Hill," let's not concede that title just yet. Rather, let's give the Soviets their due; they have produced a fine tactical helicopter that increases the overall dimension of the Soviet threat. On the positive side, the Hind should have removed any complacency we may have had about Soviet attack helicopters.

"Hangar Talk" is a quiz containing questions based on publications applicable to Army Aviation. The answers are at the bottom of the page. If you did not do well, perhaps you should get out the publication and look it over.

Hearing Conservation

TB MED 501

Captain John J. Fearing
Aviation Safety Officer
311th Aviation Battalion (CBT)
Dallas Naval Air Station, TX

1. Noise, in the nontechnical sense, is any unwanted sound. It may be steady or consist of one or more impulses. It is usually applied to sound components that extend over a wide range of frequencies, not generated to convey a meaning or information.
A. True B. False

2. DOD facilities, such as U.S. Army airfields, are subjected to a criteria consistent with the Occupational Safety and Health Act of 1970 as outlined in Executive Order 11807 and 29 CFR 1960.40.
A. True B. False

3. Which of the following is *not* one of the essentials of a Hearing Conservation Program?
A. Health Education Programs
B. Posting of noise-hazardous areas
C. Weekly meetings concerning the effects of noise
D. The use of hearing protection devices

4. A permanent threshold shift or loss of hearing, which is very painful and sudden, is usually the result of damage to the hearing organ known as the Corti. However, this situation can be corrected by medical procedures.
A. True B. False

5. Enlisted personnel with a 67 series MOS title do not require either a reference or periodic audiometric evaluation prior to being assigned to noise-hazardous areas.
A. True B. False

6. The SPH-4 aviator's helmet is designed for both head protection and maximum noise attenuation. However, it is necessary to periodically inspect and determine the serviceability of the earcup seals to ensure adequate noise attenuation.
A. True B. False

7. The responsibility for promoting an effective Health Education Program in conjunction with the unit Hearing Conservation Program belongs to the:
A. Unit aviation safety officer
B. U.S. Army Environmental Hygiene Agency
C. Unit commander
D. Unit medical personnel

8. Although earplugs will provide adequate protection against unwanted sound if worn correctly, they will also make understanding normal speech very difficult.
A. True B. False

9. All noise-hazardous areas at U.S. airfields must be surveyed at least annually or within 30 days of any change in an operation affecting noise levels. These results must be recorded on a DD Form 2214.
A. True B. False

10. When the steady noise level in the work place is _____ or greater regardless of the duration, hearing conservation measures should be initiated.
A. 140 dBP
B. 90 dB
C. 85 dBA
D. 120 dBC

Answers

1. A, para 1-l **2.** A, para 1-c **3.** C, para 4 **4.** B, para 3-b, fig 1-7 **5.** B, app G **6.** A, para 8-j **7.** D, para 10-b **8.** B, fig 1-1 **9.** A, para 5-a.4 **10.** C, para 5-b

REPORTING FINAL

Late News From Army Aviation Activities

Photo by James W. Bellman

Nonstop Flight. A flight record was established by a UH-60 Black Hawk with an External Stores Support System carrying four fuel tanks.

FROM FORT RUCKER

Black Hawk Record. A UH-60 Black Hawk that landed at Ft. Rucker's Cairns Army Airfield on 5 May made history in two ways: It was the first military developmental test flight of the External Stores Support System, and it was the longest flight for the system.

The nonstop 880-mile flight from the Sikorsky Aircraft plant in Stratford, CN to the Aviation Center took 7 hours and 48 minutes. Without the fuel tanks carried on the ESSS, the aircraft would have had to refuel about every 2 hours and trip time would have been about 12 hours.

At Ft. Rucker the ESSS-equipped Black Hawk will be tested by the Army Aviation Development Test Activity.

USAAVNDTA's project officer for the ESSS evaluation is CPT Richard Hudgens, who also was pilot for the flight from Stratford. He believes acquisition of the ESSS is a big step for Army Aviation: "These additional hours of flying time mean we can self-deploy to Europe or Alaska or wherever we need to go." Pamela Bellman

USAAVNC PAO

Photo by James W. Bellman

First To Fly. The crew of the UH-60 Black Hawk helicopter that made the Army's first developmental test flight of the External Stores Support System are, from left, SSG Terry Brandenburg, WO Timothy S. Sullivan, CPT Richard Hudgens and MAJ Buddy Buie. They are all assigned to the Army Aviation Development Test Activity at Ft. Rucker.

Museum Fund Hits $1 Million. The Ft. Rucker Museum Fund Drive had hit the $1 million mark, when the 1983 campaign garnered $50,505.29, according to COL Ed Brown (Ret), the museum foundation's director of development.

Included in the "milestone million" were two checks presented Thursday to COL Max McCullar (Ret), chairman of the Museum Foundation's executive committee.

COL Ercie J. Leach, Ft. Rucker's director of industrial operations, presented a check for $4,885 as a result of the April volksmarch. Three DIO sponsored volksmarches have now realized $15,909 for the museum's construction.

COL Joseph R. Koehler, commander of the U.S. Army Safety Center, gave COL McCullar a check for the post's 1983 campaign, bringing the total for 1982 and 1983 post drives to $130,505.29. COL Koehler is the president of the Ft. Rucker chapter of the Army Aviation Association of America which planned, organized and conducted the 1983 drive.

Ft. Rucker's commanding general, MG Carl H. McNair Jr., called the attaining of the first million "the hardest part to achieve and a legacy to those who have helped reach this goal."

COL Brown explained what was to be accomplished at different money levels. "When we get to $1.5 million, the foundation will let a contract to complete final plans and specifications. When we reach the $2 million mark, engineers will prepare the site for construction. At the $2.5 million level, we will solicit bids for the construction, and at $2.5 million, the actual construction will begin."

If you would like to help build the Army Aviation Museum, contributions can be sent to the Army Aviation Museum Foundation, P.O. Box H, Ft. Rucker, AL 36362.

CONSOLIDATED GLOSSARY

ABC	advancing blade concept
ACP	air control point
AFB	Air Force Base
AHB	attack helicopter battalion
AHIP	Army Helicopter Improvement Program
ALSE	aviation life support equipment
ALSO	aviation life support officer
ARNG	Army National Guard
ATGM	antitank guided missile
AVCRAD	Aviation Classification Repair Activity Depot
AVN	aviation
AVUM	aviation unit maintenance
BN	battalion
C^3	command, control and communications
CAV	cavalry
CBAA	Cavalry Brigade (Air Attack)
CBI	China, Burma, India (Theater)
CEWI	combat electronic warfare and intelligence
COMM CARD	communication card
CSAC	combat support aviation company
DA	Department of the Army
Det 101	Detachment 101
DIO	Directorate of Industrial Operations
DIVARTY	division artillery
DMOS	duty military occupational specialty
ESSS	External Stores Support System
FLIP	flight information publication
GCA	ground controlled approach
GSR	ground surveillance radar
HHT	headquarters and headquarters troop
HQDA	Headquarters, Department of the Army
HTLD	High Technology Light Division
ILS	instrument landing system
IP	instructor pilot
IMC	instrument meterological conditions
IN	Infantry
JAAT	joint air attack team
JCS	Joint Chiefs of Staff
JP-4	aviation fuel
LHX	light helicopter family
LZ	landing zone
MG	machinegun
MOS	military occupational specialty
mph	miles per hour
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NAV	navigation
NAVAIDs	navigational aids
NAVAIR	Navy Air
NCO	noncommissioned officer
NDB	nondirectional beacon
NOE	nap-of-the-earth
NOTAR	no tail rotor
NSN	national stock number
OCSA	Office Chief of Staff, U.S. Army
ODCSOPS	Office, Deputy Chief of Staff for Military Operations and Plans
OMG	operational maneuver groups
ORB	Officer Record Brief
OSS	Office of Strategic Services
POL	petroleum, oil and lubrications
PRC	position requirements code
PSC	pilot status code
SIDPERS	Standard Installation/Division Personnel System
TAMC	Transportation Aircraft Maintenance Company
TCATA	TRADOC Combined Arms Test Activity
TM	technical manual
TOW	tube-launched, optically-tracked, wire-guided
TRADOC	(U.S. Army) Training and Doctrine Command
USAAVNC	U.S. Army Aviation Center
USAAVNDTA	U.S. Army Development Test Activity
Vmc	velocity minimum control
Vyse	safe single-engine rate of climb speed
WIARNG	Wisconsin Army National Guard

BE PREPARED

The Unplanned Single-Engine Go-Around

A GREAT DEAL of instruction and training is devoted to engine failure during flight and especially engine failure immediately after takeoff.

Most Army aviators can safely handle the emergencies or engine failures that have been stressed the most and those situations in which adequate training and repeated practice occur on almost every training flight.

Accident statistics reveal that the engine failures that occur following adequate training and practice present little or no problem; the emergency situation is usually handled properly and the aircraft is landed safely.

It is the unexpected situation or failure of an engine at a time and place that the pilot least expects (or has had inadequate or insufficient training and practice) that results in accidents. For example, engine failure at a reduced power setting such as during descent on an instrument approach or final approach for landing; this is far more difficult to recognize immediately compared to engine failure at higher power settings such as cruise or climb.

If the failure occurs during the approach to landing and a go-around or missed approach is started, then the pilot is faced with the problem of low airspeed, landing configuration and safe aircraft control while performing the required emergency action items in the checklist.

There is a point during all approaches just before touchdown that can be particularly hazardous. If an unplanned go-around or emergency situation arises requiring a go-around, the aircraft may come very close to or actually touch the runway (resulting in an unplanned touch-and-go landing) while advancing the power levers and configuring the aircraft for the go-around. During all normal operations this situation should never occur. We plan our approaches to preclude the need for a go-around, but we should be prepared to do so as soon as we recognize the need. The unplanned, last-minute, emergency-type go-around catches us unprepared. This situation usually prompts hurried actions by the pilot, resulting in abrupt or sudden high power settings at a low airspeed, premature gear and/or flap retraction, and the possibility of engine failure at the most inopportune time when the pilot least expects it or is least prepared.

Safe aircraft control *must* be maintained. This requires attaining at least Vmc. Remember that at Vmc, you are not guaranteed that the aircraft will even maintain altitude, much less climb. This situation, depending on the particular aircraft and the aircraft configuration, may require that a descent be entered, if altitude is available, to regain safe flying speed and to accelerate to safe single-engine rate of climb speed, Vyse.

A go-around initiated in landing configuration sets up an ideal situation for potential problems in the event of engine failure. The probability of engine failure is more likely during power changes—particularly rapid changes in power after prolonged operation at a low power setting as in a descent or preparation for landing. *All instrument approaches and normal approaches for landings should be made in accordance with the appropriate aircrew training manual and within limits specified in the aircraft operator's manual.*

When making a go-around or missed approach, the pilot should carefully monitor power application and engine performance for normal operation. Any indication of engine malfunction dictates that the go-around or missed approach be

aborted and a *landing* made if *safely possible.*

If a safe landing cannot be made, *maintain aircraft control,* complete the missed approach or go-around, and land as soon as safely possible. If it's apparent that the go-around can't be accomplished nor a safe landing made at the airport, it is much safer to land under control on almost any terrain rather than to lose control of the aircraft and contact the ground in an uncontrolled situation. Aircraft *control* in this situation is *most important.*

Remember, that sudden or abrupt power application may result in engine damage, failure or loss of aircraft control. In turbine powered aircraft, the power level can be advanced all the way to full power position before the engine accelerates to full power. Be alert for power lag and *control the increase of power* by proper application of power control; don't let the sudden surge of power catch you unprepared. Accelerate to and maintain at least Vyse. It may be necessary to add power (as much as possible and still maintain control); lower the nose or descend (if altitude permits) to regain Vyse.

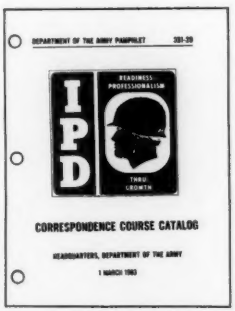
Make sure that the aircraft will not touch the ground before you retract the landing gear, and that you have sufficient airspeed before you retract the flaps (sudden flap retraction at low airspeeds can result in loss of altitude or control). Retract the flaps only as safe airspeed permits. Your particular aircraft may require flap retraction in increments as the airspeed increases.

Whatever you are flying, know your aircraft. Maintain aircraft control at all times. Follow the emergency procedures.

Be alert.
Be prepared for the unexpected.
Live to fly another day.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hot Line, AUTOVON 558-6487 or 205-255-6487 and leave a message

New Correspondence Course Catalog



For more information contact:
Institute for Professional Development
U.S. Army Training Support Center
Newport News, VA 23628
AUTOVON: 927-3085
COMM: 804-878-3085

THE INSTITUTE for Professional Development recently distributed the first comprehensive catalog of Army Correspondence Course Program courses and subcourses. This new publication, DA Pamphlet 351-20, "Correspondence Course Catalog," was sent to unit training offices, education centers and military occupational specialty libraries. There are 490 courses and 3,000 subcourses listed in the 716-page catalog. Dated 1 March 1983, this one book replaces all 22 volumes in the previous DA Pam 351-20 series.

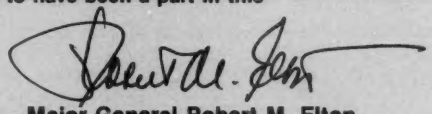
All correspondence courses produced by 18 different TRADOC schools and 4 Department of Defense/Department of the Army consolidated activities are included. Officers, warrant officers and enlisted personnel in Active and Reserve Components, Reserve Officers' Training Corps, National Defense Cadet Corps, authorized federal employees, foreign military, government contractors and non-U.S. citizens employed by DOD are eligible to study selected correspondence courses.

Correspondence courses are free of charge to all U.S. Armed Forces. Active Army soldiers, E-5 and below, receive one promotion point for every 5 hours of correspondence course credit. National Guard and Reserve officers and enlisted soldiers receive one retirement point for every 3 hours of correspondence course credit. Completion certificates and a limited number of diplomas are awarded. Some courses may be accepted for credit toward a college degree.

INDEED, ARMY AVIATION has begun an exciting new era in the 9th Infantry Division. The advent of the Cavalry Brigade (Air Attack), or CBAA, has made the division's aviation assets more responsive to the commander and has also provided the extra dimension of an additional maneuver brigade headquarters that can be employed in the scheme of the maneuver. I have been extremely gratified with the results of the CBAA tests in May 1982. Moreover, the process of fully integrating aviation into our new concepts of what is known as the High Technology Light Division has been demonstratably validated in our most recent division exercise, LASER MACE. CBAA has proven to be an integral and vital member of the 9th Infantry Division team.

Many new ideas and concepts were incorported into the original CBAA tested a year ago. We continued to look for even better ways and ultimately made what I consider to be one of the most significant advances in the entire division and that was the organization of the Light Air Cavalry Troop, employing a generic type of light combat helicopter. This particular concept, I am convinced, will pay large dividends for future light divisions in the Army.

Without a doubt, the addition of the CBAA to the 9th Infantry Division—and CBAAs to other divisions—has marked a major milestone for both the Army and Army Aviation. I am extremely proud to have been a part in this significant advance for the Army.



Major General Robert M. Elton
Commander, 9th Infantry Division
Fort Lewis, WA

UH-60 Black Hawk being refueled by members of the 9th Cavalry Brigade, Ft. Lewis.

CONSOLIDATED GLOSSARY—Page 35

RETROSPECT and PROSPECT

Colonel Thomas H. Harvey Jr.

THE PAST 30 months with the 9th Cavalry Brigade (Air Attack) prove the old adage that "time goes fast when you're having fun." Activation of the headquarters on 18 December 1980 seems like it was just yesterday, but the kaleidoscopic events, exciting, challenging and rewarding, have laid the foundation for the new age of aviation. The long period of organizing, training and testing* has culminated in the validation and approval of an exciting and "come of age" concept. And even now *that* concept is being refined and expanded. But, more on that later.

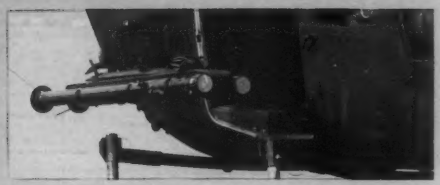
Before we look at some of the specific results and accomplishments, tribute must be paid to the dedication and hard work of so many officers and soldiers in the brigade. They worked in a "pressure-cooker" atmosphere with a compressed time schedule and performed in an absolutely outstanding manner. The battalion commanders, Mike Mullen, Dave Carothers, Lou Bouault and Wayne Mock gave their very all and deserve accolades for a stupendous job. Also, the many company/troop commanders and staff officers made an invaluable contribution as did innumerable NCOs and soldiers. And, let's not forget the backbone of aviation, the warrant officers. To name only a few, such as Bob Falen, Jim Deason, Larry McGlamery and Lee Murphy, the aviation warrant officers deserve kudos for the "go-power" they provided. What they all wrought is a formidable and potent organization that will pay dividends in the future.

Our experiences and the tests demonstrated that the addition of the CBAA not only makes aviation more responsive to the division commander by providing focus, continuity and centralized support, but it also gives him an additional maneuver brigade headquarters. The latter view of the CBAA, approved by the U.S. Army Training and Doctrine Command, was vividly demonstrated during the May 1982 test and adds another dimension to aviation forces. With the attachment of other combat arms and support forces the CBAA has the staff organization and wherewithal to do its full share on the battlefield as a maneuver brigade. It needs to be pointed out that only with the support and faith of Major General Robert M. Elton, the 9th Infantry Division commander, did we have the opportunity to attempt and validate the maneuver aspect of CBAA.

There were some other ideas that bore fruit and proved there are new ways to do business. All of our companies and troops, except HHT, 3-5 Cav (3d Squadron, 5th Cavalry) and the TAMC, were commanded by captains, and I must add that they did a splendid job. The attack helicopter companies and air cavalry troops are much smaller, 35 to 37 people (CSACs remained the same), and are one feature of the concept of separating fighters from support elements. The attack helicopter battalions and cavalry squadron have the AVUM, POL and all other support concentrated in the headquarters element and it has worked in concept satisfactorily. Also, the reconfiguration of the Army's standard attack helicopter company of 21 attack helicopters into a battalion proved to be workable and facilitated the employment of the attack helicopter battalion in the divisional scheme of maneuver. Moreover, it greatly enhanced the battalion commander's control and reinforced the doctrinal concept of employing the unit as an entity instead of committing its elements piecemeal about the battlefield.

There were some minor shortcomings that became evident during the testing, and TRADOC

*See "9th CBAA—Mission First," by Colonel Thomas J. Harvey Jr. in the December 1981 *Aviation Digest*, page 40.



Rapid deployment testing by the 3-5 Cav (9 CBAA), 9th Infantry Division, at Gary AAF, Ft. Lewis, WA, 21 March 1983 showing: TOP LEFT, M27 machinegun mounted on JOH-58C; BOTTOM LEFT, Stinger antiaircraft missile system on JOH-58C; RIGHT, JOH-58C. The "J" indicates experimental/nonstandard equipment such as weapons, sights, direct view optics or air transportable equipment.

is in the process of recommending changes. We found the overall maintenance structure to be a little on the short side, but a number of small fixes will round out the organization to an optimum configuration.

Looking to the future, the 9th Infantry Division is in the process of organizing and testing the concept of the High Technology Light Division. The principal reorganization underway in the CBAA involves the cavalry squadron which we have now made an air cavalry squadron with three air troops and one ground as opposed to the Infantry Division 86 squadron of two and two which we tested. With the principal mission of the HTLD to fight in contingency areas over battlefields of great expanse, our judgment was that three air cavalry troops could do a better job. Additionally, we changed the air troop organization from the 6 scouts and 4 attack helicopters to a makeup of 13 conceptual light combat helicopters—a modified AHIP perhaps—which would have direct view optics for sights and also would be armed with TOWs or a combination of rockets, Stinger and minigun. This type of helicopter still fulfills the basic calvary role and also adds the dimension of a light attack capability as the first elements to be deployed via C-130s as part of the HTLD's lodgement scenario. Further, we have placed back into this troop structure a squad of scouts with motorcycles and GSRs so that they can accomplish the full cavalry mission. It is an exciting and enticing concept which began tests last month, using JOH-58C Kiowas—another first for the CBAA!

While the CBAA has advanced aviation doctrine a long way, there remains a lot yet to be accomplished. The process of educating and learning together with ground commanders who are more attuned to the tactics of Vietnam is a continuous one. The commanders in the 9th Division have embraced the CBAA concept as their own and are inhibited now only by imagination. However, as the next CBAA is activated (following a schedule approved for implementation), the process of learning and educating will be repeated. To be certain, CBAA employment may be somewhat different in a heavy division from that in a light division, but the basic concept remains essentially the same. It has proven to be a valid concept that certainly provides the Army with a force multiplier of significant dimension.

ABOUT THE AUTHOR

Colonel Harvey was commissioned from the United States Military Academy in 1958. He is a graduate of the United States Army Command and General Staff College and the Naval War College. He holds an M.A. in political science from Kansas State University.

Colonel Harvey has served at ODCSOPS and OCSA, HQDA and as executive assistant to the Director, Joint Staff, JCS, in Washington, DC. He has commanded C Troop, 1/9th Cavalry in Vietnam, and 3d Squadron, 4th Cavalry in Hawaii, commanded the Army's first Cavalry Brigade (Air Attack) at Ft. Lewis, WA. He is serving an Army Senior Fellowship at the Council of Foreign Relations in New York.

photo by Elaine L. Walton

Colonel Thomas H. Harvey Jr.

The 9th Cavalry Brigade (Air Attack) was organized in the 9th Infantry Division, Ft. Lewis, WA, as a concept in late 1980. It was implemented Armywide by Army Chief of Staff General Edward C. Meyer on 27 January 1983. The author discusses how the 9th grew from an idea to an accepted reality.

9TH CBAA

The Combat Ready Maneuver Brigade

LTC Alexander Woods Jr.

IMMEDIATELY AFTER its activation in early 1981, the 9th CBAA began to perform a myriad of actions. All efforts during that critical first year were directed toward the ultimate goal of readiness to perform the brigade's combat mission. The concept of CBAA evolved as a result of Army 86 studies which recognize the need to combine all of the division's aviation assets and supportive maintenance under one command. It has been the newest and largest project in Army Aviation since the 11th Air Assault Division (T) was organized and tested in the early 1960s.

CH-47 Chinook provides a "big lift."

Why CBAA? Why was the mission handed to the 9th Division to implement such a complex yet effective organization? The answer is simple. The Army is planning to meet numerically superior and increasingly sophisticated threats over the next decade through improved tactical concepts and the introduction of new advanced materiel systems. In order for the advances expected from these new tactics and systems to be of the greatest value, they

An AH-1 Cobra of the 9th CBAA flies in support of the newest and largest Army Aviation project since the 11th Air Assault Division tests.

must be incorporated into organizations that can make the most of them.

The magnitude of the changes in warfare brought about by these increased capabilities and the logistics and training to support them demanded a new organizational framework so that an orderly transition could be made from present units to those of the mid-1980s and beyond.

Hence, CBAA! CBAA not only improves the unity of command, and economy of force operations, but also increases staying power and combat power and enhances combined armed force operations and command, control, communication and intelligence.

The intense evaluations conducted at Ft. Lewis and the Yakima Firing Center in the spring of 1982 validated the brigade's new and innovative concepts for employing Army Aviation in the AirLand Battle.

Using 80 percent of assigned aircraft and flying each 4 to 6 hours per day, the CBAA successfully performed multiple operations in both European and Mideast scenarios.

The striking results of these evaluations are not based on conceptualizations or theories, but rather on closely scrutinized and carefully documented brigade operations. More than a quarter-million gallons of JP-4 were pumped, nearly 5,000 aircraft hours were flown, about 50,000 rations served and more than 500 aircraft missions were completed during continuous tactical field operations.

On 16 April 1981, the commander of USACAC directed that the TRADOC Combined Arms Test Activity conduct an evaluation of the CBAA at Ft. Lewis.

The test objectives were threefold:

- To assess the command and control procedures of the CBAA and its subordinate units as it accomplished its missions.
- To assess the logistics and administrative supportability of the CBAA and its subordinate units as it accomplished its mission.
- To obtain data to support an evaluation of the organizational structure of the brigade and its subordinate units as it accomplished its mission.

Testing was conducted in three phases. Pilots for two of the three phases began on 12 January 1982 on the Ft. Lewis reservation. During Phase One, the purpose was to exercise the test control organization and instrumentation systems and to detect any deficiencies in planning and training or coordinating prior to conducting the actual evaluation test. Addi-

An OH-58 Kiowa helped prove that CBAA C³ procedures are an improvement over previous division aviation organizations.

tionally, data was collected during the pilot tests on the organization of the HHT of the CBAA. This enabled improvements to be made to the organization prior to Phase Two.

Phase Two of the test was also conducted at Ft. Lewis. During this test portion, each of the major subordinate units was evaluated separately, to refine each type of organization prior to evaluating the entire cavalry brigade: A sort of subunit evaluation action.

Major findings of Objective One, Phases One and Two were: C³ was better; however, the division was not organized to support a fourth brigade; there were insufficient radios; more command and control aircraft were needed and the air cav troop C³ required fine tuning.

Objective Two revealed that staying power of the CBAA was better, but refueling and transportation systems needed to be bolstered, forklift mobility was restricted, support equipment available was incompatible with existing systems, capabilities for night maintenance were limited and recovery procedures needed improvement.

Objective Three found that the CBAA structure was more effective, unity of command was better, and the use of a CBAA as the fourth maneuver brigade was effective; however, crew rest limited operations, medical structure was insufficient and the cav squadron's area of operations was too large.

A dynamic review committee, chaired by TCATA and consisting of senior officer representatives from the High Technology Test Bed, USACAC, the U.S. Army Transportation Center, the U.S. Army Armor Center, the U.S. Army Infantry Center, the U.S. Army Aviation Center and the CBAA, reviewed all suggested improvements and recommended to the test director refinements to the CBAA organization or its operating procedures.

They found that when implemented with suggested improvements, the CBAA would have the capability to perform its C³ mission effectively, the logistical concept would enhance its supportability and staying power, and that personnel and equipment would be structurally organized to perform the CBAA mission.

During the first portion of Phase Three, the major subordinate units of the CBAA were evaluated independently in a European scenario. In April 1982, primary emphasis was on the organizational structure and its internal support in the performance of the mission.

During May 1982, Phase Three evaluated the CBAA in a Mideast scenario at Yakima Firing Center. Primary emphasis was on supportability of the organization and command and control. Live fire, electronic warfare, and nuclear, biological and chemical defense were integrated throughout. Forward arming and refueling point operations were totally checked and validated. Threat forces consisting of two motorized rifle regiments augmented by tanks were maneuvered on varying terrain, and tactics were optimized within the constraints of the training area boundaries. Flight hours, consisting of 4 hours per day per aircraft, as expected in combat, peaked with a final surge period of 6 hours per day.

The result: CBAA C³ procedures are a dramatic improvement over previous division aviation organizations; the division with a CBAA is more effective in

combat operations than previous organizations; and it is infinitely better organized to conduct independent operations as an integral component of the combined arms team.

"Therein lies the key to the effectiveness of the Cavalry Brigade," said CBAA commander, COL Thomas H. Harvey Jr. "It has become a fourth maneuver brigade within the division, giving the division commander greater flexibility in his area of influence.

"The unity of command provided by a single aviation commander controlling all division aviation assets enhances and facilitates Army Aviation's ability to support prompt and sustained land combat."

In addition to the evaluations and validations, the CBAA participated in many other contributory training events in 1982. Both its attack helicopter battalions, the 214th and the 268th, in conjunction with Air Force A-10 jet fighters from Nellis Air Force Base, NV, were involved in joint air attack team exercises. JAATs teach helicopter crews to work together with jet pilots to destroy enemy tanks and hard point targets.

The attack helicopter battalions also deployed a considerable distance on field training exercises. In September, the 268th used Gowen Field, ID, for air gunnery training. While there, they conducted JAAT exercises with F-111s from Mountain Home AFB.

Overall, the 9th CBAA spent in excess of 100 days in the field during various exercises. Numerous battalion and squadron level exercises strengthened the CBAA as a combat ready, maneuver brigade. Just a few of the many were: Red Flag/Green Flag/JAAT in February, cold weather training and adventure training in March, combined arms live fire in April, mountain training in July, lodgement exercises in August, jungle warfare training in September, and nap-of-the-earth and Deep Strike missions in September. The 214th, 268th and the 3-5 Cav conducted numerous JAAT exercises with Air Force A-10, F-111, F-16 and A-7 jet fighters throughout fiscal year 1982.

In a recent endorsement to the nomination of the 9th CBAA as the outstanding professional Army Aviation Unit of the Year, the 9th Infantry Division commanding general, Major General Robert M. Elton said, "Not only is the performance of the cavalry soldiers in the highest traditions of the Old Reliables of the 9th Infantry Division, but the results of their efforts....will carry U.S. Army Aviation into the next century.

"Validation of new and innovative concepts for employing Army Aviation in the AirLand Battle has already resulted in dramatic changes to aviation. Most importantly, it has finally been integrated into the combined arms team as a fourth maneuver brigade. By separating fighters from supporters in providing unity of command to Aviation, I have been armed with a light, lethal force capable of striking deep and in turn influencing the close-in battle."

The CBAA already is a reality in the 9th High Technology Light Infantry Division. On 27 January 1983, the Chief of Staff of the Army directed TRADOC to continue implementation in other selected divisions of the CBAA organizational structure and operations procedures.

Cobra in the attack

ABOUT THE AUTHOR

Lieutenant Colonel Alexander Woods Jr.

LTC Woods was commissioned a distinguished military graduate through the ROTC program at Eastern Washington University. His assignments include platoon leader and executive officer in the 82nd Airborne Division. He further served as an aviation platoon leader, battalion operations officer and aviation company commander in the 1st Cavalry Division in South Vietnam. He also served as a battalion S2, S4 and rifle company commander in the 4th Battalion, 6th Infantry in Germany. He has served on a general staff and is currently the executive officer of 9th Cavalry Brigade (Air Attack).

U.S. Army Communications Command
ATC ACTION LINE

The FLIP En Route Supplement

Mr. Carl H. Gray
U.S. Army Air Traffic Control Activity
Aeronautical Services Office
Cameron Station, Alexandria, VA

WHEN WAS THE last time you looked at the en route supplement listing of your airfield or heliport? Not just a glance to see if it's still listed, but to really *study* the information shown to ensure that it is accurate and up to date. This also includes you people who are tenants at other civil and military airfield installations. You know your home field better than anyone else—check all of the entries. Here is a short list of items that change most frequently (not necessarily in the order listed):

- **Airfield/heliport lighting.**
- **Fuel.** Types available.
- **Aerodrome remarks.** This item gets a lot of action. Brevity is most important. Are the footnotes relevant to the items flagged?
- **Communications.** Are the frequencies correct and up to date?
- **Radio aids to navigation.** Are all of your radio NAVAIDs listed? Is the type facility shown correctly? Is the correct power output listed?
- **Radio/nav remarks.** Is the information correct? And again, watch those footnotes.

Don't hesitate to notify us (by COMM CARD) of any change, addition, deletion or amendment that is required. The information listed is extremely important. It provides the data necessary for all aviators to fulfill mission requirements.

Any entry changes that you provide will be incorporated into the next available publication cycle. If you have problems in making changes, call us at AUTOVON 284-7773; someone will assist you. Please keep us informed. Remember, when we're informed, Army Aviation is informed.

There are changes taking place that affect the size and shape of the en route supplements issued worldwide. The present size of the supplement, 5 by 10 inches, is being changed to 5 by 8 inches. There is also a change to the type size and style to enable you to read the text easier. The latest newly formatted supplement is the February 1983 publication for Africa. The remaining area supplement changes will be made during their normal publication cycles through the remainder of 1983.

Readers are encouraged to address matters concerning air traffic control to:
Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22314

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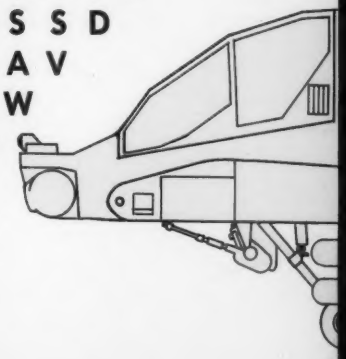
Aircraft Word Search

This quiz is a test of your knowledge of aircraft nomenclature. We have given you the official designations for a variety of Army, Navy, Marine and Air Force aircraft; you find and circle the correct nickname.

Answers are on page 15.

AH-1	CH-34	CH-54	OH-23	TH-57A
AH-56	CH-37	H-25A	OH-58	UH-1
AH-64	CH-46	H-43	R-4B	UH-2
CH-3E	CH-47	OH-6A	SH-3D	UH-19
CH-21	CH-53E	OH-13	TH-55	UH-60

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O U I C M L S E A R A N G E R T N K B C H E Y E N N E B
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I R J E H Q V B Y V W F X H E H D H K N K A A R X
G S C L Z P O E A M C A Y U S E M K E O A X P D
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W A T C O H C L I N G A U S H M Y A A K A V
O L H A N S I P L O I M O J A V E L R E W
F L U N E K T H G I N K A E S O E B S O
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